HELSINKI SCHOOL OF ECONOMICS (HSE)
Department of Accounting and Finance

PERFORMANCE PERSISTENCE AND FLOW DETERMINANTS OF FIXED INCOME MUTUAL FUNDS

Evidence from Finland

Finance
Master´s thesis
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Master's Thesis in Finance
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ABSTRACT
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PURPOSE OF THE STUDY

The objective of this thesis is two-fold. First, the study aims to examine relationship between past and future performance of fixed income funds in the Finnish mutual fund market. The focus of the investigation is in detecting any form of performance persistence in the fund returns by using Spearman rank correlation test and regression analysis. Second objective of the study is to analyse the effect of fund specific attributes on the external fund growth of the Finnish fixed income funds. Cross-sectional time series regression analysis is employed to detect the flow determinants of the funds.

DATA

The data in this thesis comprises of the quantitative and qualitative information provided in the Finnish Association of Mutual Funds' monthly Mutual Fund Reports and the index data obtained from Thomson Financial Datastream. The monthly return data used for the performance persistence study cover the period January 1995 to December 2004. The time period of the flow determinant study extends from January 1994 to December 2004.

RESULTS

The results for performance persistence study indicate that money market funds in the Finnish mutual fund market perform consistently and the persistence in performance lasts over time. The result is consistent with existing literature. Bond funds are found to exhibit strong performance persistence only during the period 2002-2004. Thus, the results do not lend strong support for bond fund performance persistence over time. The results are not severely influenced by survivorship bias in the sample.

The findings from the flow determinant study show that, consistent with international evidence, the fund size has a negative impact on the external growth of Finnish fixed income mutual funds. Relative performance of funds does not have an effect on the fund selection process of investors whereas absolute performance affects the flows to bond funds positively. External fund growth is positively correlated with the previous money flows to the funds. Relation to a bank is beneficial for the external fund growth of a Finnish fixed income fund. Bank related funds are found to receive higher flows than their non-bank counterparts.

KEYWORDS

Mutual funds, fixed income funds, performance persistence, external fund growth, flow determinants

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PERFORMANCE PERSISTENCE AND FLOW DETERMINANTS OF FIXED INCOME MUTUAL FUNDS – EVIDENCE FROM FINLAND

TUTKIELMAN TAVOITTEET

Tällä tutkielmalla on kaksi päätavoitetta. Ensiksi, tutkielmassa pyritään selvittämään korkorahastojen menneen ja tulevan tuoton välistä suhdetta Suomen rahastomarkkinoilla. Mahdollista systemaattisuutta rahastojen välisessä paremmuudessa ja tuotoissa tutkitaan käyttäen Spearman rank korrelaatio testiä ja regressioanalyysiä. Tutkielman toinen tavoite on analysoida rahastojen yksittäisten attribuuttien vaikutusta rahastojen ulkoiseen kasvuun. Näiden attribuuttien vaikutusta rahastoihin suunnattujen rahavirtojen määrittäjänä analysoidaan käyttäen usean muuttujan regressiomallia.

LÄHDEAINEISTO

Tämän tutkimuksen aineisto koostuu Sijoitusrahastoyhdistyksen julkaisemista Rahastoraporteista löytyvästä rahastokohtaisesta informaatiosta sekä Thomson Financial Datastreamin tuottamista indeksitiedoista. Aikavälin tammikuu 1995 ja joulukuu 2004 välistä kuukausittaista tuottoinformaatiota käytetään selvitettäessä rahastojen tuottojen systemaattista paremmuutta. Analysoitaessa rahastojen suunnattujen rahavirtojen määrittäjiä aikaväliä laajennetaan käsittämään vuosi 1994 kokonaisuudessaan.

TULOKSET

Tutkielman tulokset osoittavat, että lyhyen koron rahastojen välinen paremmuus säilyy systemaattisesti samanlaisena vuodesta toiseen tutkintaperiodin aikana. Tulos on yhdenmukainen aikaisempien kansainvälisten havaintojen kanssa. Pitkän koron rahastojen välinen paremmuusjärjestys oli systemaattisesti samanlainen aikavälillä 2002-2004. Tämä ei kuitenkaan anna aihetta olettaa, että pitkän koron rahastojen välinen paremmuus ei muuttuisi ajan kuluessa.

Suomalaisten korkorahastojen koolla havaitaan olevan negatiivinen vaikutus niiden ulkoiseen kasvuun. Tulos on yhdenmukainen kansainvälisten tutkimusten kanssa. Rahastojen välisellä suhteellisella paremmuudella ei havaittu olevan vaikutusta sijoittajien sijoituspäätöksiin. Sen sijaan rahastojen absoluuttisella tuotolla on positiivinen vaikutus pitkän koron rahastoihin virtaaviin rahavirtoihin. Korkorahastoihin virranneet aikaisemmat rahavirrat korreloivat positiivisesti rahastojen nykyhetken ulkoisen kasvun kanssa. Suomalaisille korkorahastoille näyttää olevan hyötyä siitä, jos niitä hallinnoima rahastoyhtiö on pankin omistuksessa ja siten rahastolla on käytettävissään pankin jakeluverkosto. Tutkimustulosten mukaan tämän pankkiyhteyden omaavat korkorahastot kasvavat muita korkorahastoja nopeammin.

AVAINSANAT
Sijoitusrahastot, korkorahastot, rahastojen vertailu, tuotot, ulkoinen kasvu

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1. INTRODUCTION

Since the early studies (e.g. Sharpe 1966), the research on mutual funds has increased with the popularity of mutual fund investing among private investors. Mutual fund performance and the determinants of external fund growth have received considerable attention in the finance literature. Majority of the earlier research has concentrated on equity and balanced funds and has been of U.S origin. In Finland, as well, the fixed income market has remained almost completely unexamined, although it has become the single largest part of the Finnish mutual fund market.

The popularity of fixed income funds has experienced a swift increase in Finland. At the end of year 2000, stock funds dominated the Finnish mutual fund market with a market share of 46 %. Balanced funds occupied 27 % of the market followed by bond and money market funds with market shares of 14 % and 12 %, respectively. The tougher economic climate that followed the year 2000 had a profound impact on the distribution of assets in the Finnish mutual fund market. By the end of year 2005, the market share of equity funds had dropped to 37 % and balanced funds share of the market had plummeted to 12 %. While the latest five years have seen the relative popularity of equity and balanced funds decreasing, fixed income funds have enjoyed market share growth. At the end of 2005, bond and money market funds held, respectively, 23 % and 24 % of the assets in the Finnish mutual fund market. Equity funds have lately gained back some of the lost market share being the fastest growing fund category of the moment.

Bond funds accounted for 16 % and money market funds 24 % of U.S. mutual fund holdings in 2004. American and Finnish investors seem to keep the same proportion of their assets in money market funds, whereas Finnish investors hold more of their mutual fund investments in bond funds rather than in equity or balanced funds. From European perspective the distribution of funds between bond and money market funds in Finland is untypical. Bond funds held 25 % and money market funds 18 % of the European mutual fund holdings in 2005. Overall, Finnish investors appear to be more keen on the less risky investment vehicles in the mutual fund market than Americans or the average Europeans. Most of the Finnish mutual fund investments are directed into fixed income funds, the closest mutual fund substitute for bank deposits. Although equity funds are, again, increasing in popularity, it is

evident that fixed income funds are not losing their appeal. Total assets under management in bond and money market funds in Finland rose by 40 % from € 15 billion in 2004 to € 21 billion in 2005.[1]

This Master's Thesis contributes to existing literature by concentrating solely on the attributes of the Finnish fixed income mutual fund market. The aim of the thesis is two-fold. Firstly, the relation between past and future performance of the fixed income mutual funds in Finland is examined. Secondly, the determinants of flows into Finnish fixed income funds are studied. The investigation period of the study starts from the beginning of the year 1994 and ends at the end of 2004. Two methodologies are employed to examine the performance persistence 1) non-parametric contingency tables and 2) regression analysis. Determinants of external fund growth are investigated through regression analysis. The terms fund flow and external fund growth are used interchangeably in this thesis.

There are several reasons why this study is of significance. The position bond and money market funds occupy in the Finnish mutual fund market and their growth underline the importance of investigating the attributes of fixed income funds. Analysis of the performance persistence will assist investors in comparing bond and money market funds and in drawing right conclusions from the fixed income fund rankings published in the media. In addition, the findings of this thesis contribute to our understanding about what drives investors' decisions to invest into Finnish fixed income funds. This information should be of interest to fund managers and financial advisors.

There are differences between fixed income funds and equity funds both in terms of holding characteristics and investor profiles. Differences in performance among bond and money market funds are smaller than those of equity funds, since the discrepancies between the returns on the underlying assets are smaller. The U.S fixed fund investor is more risk averse, wealthier and more experienced than an equity investor[2]. These characteristic differences might hold true also for Finnish investors. As a result of the likely heterogeneity between the investor types, the behaviour of fixed income fund investors may differ from that of equity fund investors and justifies separate investigation.

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[1] Sources: Investment Company Institute, *Investment Company Factbook*, 2005 (www.ici.org); Finnish Association of Mutual Funds and European Fund and Asset Management Association, *Quarterly Statistical Release*, 3/2006.

[2] Source: Investment Company Institute, *Profile of Mutual Fund Shareholders*, 2004 (www.ici.org)

This study adds to the scarce literature on the external growth determinants of fixed income funds. I am aware of only one study that has exclusively concentrated on fixed income funds, more precisely bond funds. In his recent study, Zhao (2005) studied the flow determinants of U.S bond funds. Additionally, Thorén (1998) has examined mutual fund growth determinants in the Finnish mutual fund market including bond and money market funds as two of the investigated subcategories. Her data set is, however, far inferior in size to the one used in this thesis.

Performance of Finnish mutual funds is relatively widely studied (e.g. Kasanen and Kinnunen 1990, Heikkilä 1993, Pätäri 2000). Only a few of the studies have examined the performance of bond funds or their performance persistence. This Master's Thesis aims to fill this gap for performance persistence studies part. On bond fund performance, Uljas (2004) studied the performance of actively managed corporate bond funds in Finland in his recent Master's Thesis. Sandvall (1999) investigated the performance persistence of bond funds among other fund groups for the period 1995-1998.

The performance persistence and flow determinant studies presented in this Master's Thesis are unique in two aspects. The time period used for the study and thus, the number of funds included in it are more extensive than in the earlier Finnish studies of fixed income funds. Many earlier studies on the Finnish mutual fund market are limited by the scarcity of observations due to small number of funds included in them. The limitations of this study are related to other issues. The methodologies applied in the performance persistence study may create *survivorship bias*[3] and therefore, affect the validity of the results. In the flow determinant study the examination is limited almost entirely to determinants reported in the Mutual Fund Reports[4] and therefore, can omit important determinants not disclosed in the Mutual Fund Reports.

The rest of the paper is organized as follows. Chapter 2 discusses the mutual fund industry in Finland. A review of existing literature is presented in Chapter 3. Chapter 4 provides an overview of the data used for the study. The methodologies and results for performance

[3] For a definition of survivorship bias see section 4.3
[4] More on the Mutual Fund Reports in Chapters 2 and 4 of this thesis.

persistence and flow determinant studies are reported in Chapters 5 and 6, respectively. Chapter 7 concludes.

2. MUTUAL FUND INDUSTRY IN FINLAND

The mutual fund industry in Finland is relatively young in comparison with other EU member countries and the United States. The first mutual funds were established in 1987 when the legislation governing mutual funds came into force. During the early years, the growth of the industry remained modest due to the unstable economic situation in Finland stemming from the overheating of the economy and the subsequent banking crisis. Since the late 1990s, the Finnish mutual fund industry has experienced rapid growth. The following sections will elaborate on the size and growth of the sector and the legislation. The information presented in the sections is compiled from the internet pages of Finnish Financial Supervision Authority, Bank of Finland, Statistics Finland, Finnish Bankers Association, Eurostat, Investment Company Institute and European Fund and Asset Management Association[5].

2.1 LEGISLATION AND REGULATION

On September 1st 1987, Mutual Funds Act came into force in Finland. The original act has been amended after its' introduction. The purpose of the amendments has been to remove or lighten the extremely strict original regulation while still ensuring sufficient investor protection. After the latest amendments, effective from April 2004, the scope of the allowed activities of fund management companies encompass portfolio management and investment advisory services in addition to fund management. The amendments were also aimed at increasing investor awareness about the funds by necessitating fund management companies to publish so called simplified brochures for each fund under their management.

A fund management company that holds a permission to operate in one of the European Economic Area (EEA) countries and is in accordance with the European Union's (EU) directive governing mutual fund companies (UCITS directive) has the right to market its'

[5] The web addresses for the internet pages of the organisations are: Financial Supervision Authority (www.rahoitustarkastus.fi), Bank of Finland (www.bof.fi), Statistics Finland (www.tilastokeskus.fi), Finnish Bankers Association (www.pankkiyhdistys.fi), Eurostat (europa.eu.int/en/comm./eurostat), Investment Company Institute (www.ici.org) and European Fund and Asset Management Association (www.efama.org)

funds in the other EEA countries. Therefore, these fund management companies can market their funds in Finland, although they are still governed by the legislation of their country of registration. Fund management companies registered outside the EEA area or not in accordance with the EU directive must apply for a permission to market their funds in Finland from the Ministry of Finance.

Mutual funds' possibilities to invest in different investment vehicles are constrained in many ways in Finland. The investments to the securities of a single issuer may not exceed 10 % of mutual fund's assets. Large single issuer investments are further restrained by limiting single issuer investments comprising 5 % of the fund value to a total amount of 40 % of fund's assets. Additionally, the funds can invest a maximum of 20 % of their assets into the deposits of the same credit institution. The aforementioned restrictions do not apply to investments into securities issued by general government organisations defined in Mutual Funds Act.

In the Finnish legislation, a mutual fund itself is a tax-exempt vehicle. The fund can manage securities in its' portfolio without any tax considerations. Taxes for the funds investments are due when a unit holder receives his/her profit share from the fund or withdraws his/her funds. Profit shares received from mutual funds and any capital gains realised by selling fund units are subject to capital gains tax at 28 %. The taxes for the paid out profit shares are withheld at source by the fund management company. However, if the profit share is not paid out but instead re-invested into the fund, it is taxable only at the time of funds withdrawal. Any losses realised from mutual fund investments are tax deductible in capital gains taxation for the next three years following the year of loss realisation. Investments in Finnish mutual funds used to be subject to wealth taxation. Wealth taxation is abolished from 2006 onwards in Finland. The abolition is believed to increase households' interest towards mutual fund savings.

The Finnish Financial Supervision Authority, RATA, supervises fund management companies among other financial market participants. RATA ensures that the entities under its' supervision operate in accordance with laws, decrees, regulations and guidelines and their own rules and articles of association. Finnish mutual fund management companies have also established a self regulatory body, the Finnish Association of Mutual Funds, to give instructions, recommendations and binding rules for its' members. At the moment, the body has 23 fund management companies as members. In addition to the self regulatory element, the Finnish Association of Mutual Funds aims to provide information about investing in

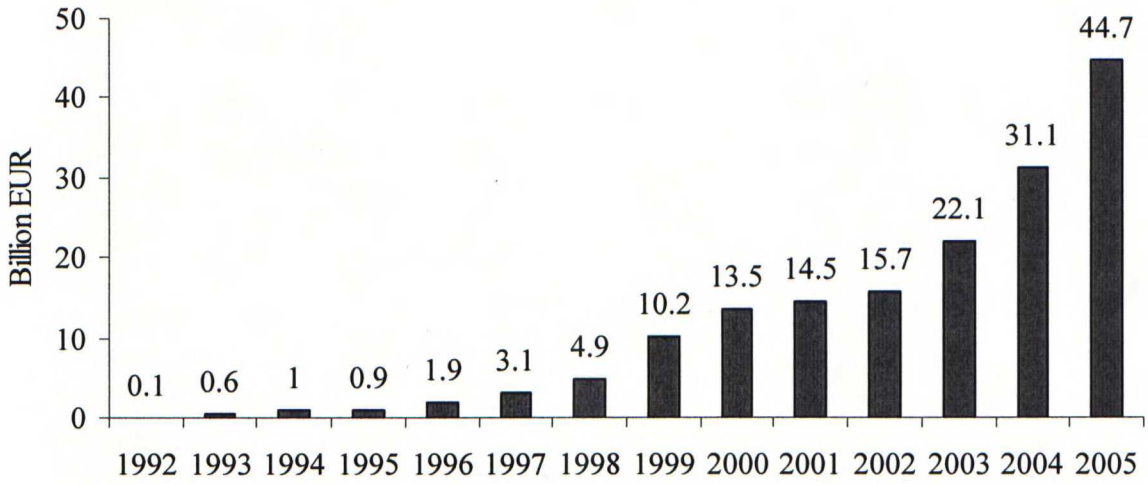
mutual funds and the funds themselves. The most visible undertaking of the association is the publishing of monthly Mutual Fund Reports, which are also the main data source of this thesis.

2.2 SIZE AND GROWTH

As noted, the mutual fund industry in Finland did not experience very high growth during the first years of its' existence. After the banking crisis, the Finnish banking sector underwent a period of internationalisation and openness. Foreign investors were allowed to own units in Finnish mutual funds in the beginning of 1992. Figure 1 presents the growth in assets under management in mutual funds registered in Finland between years 1992-2005.

Figure 1

Assets under management in mutual funds registered in Finland



Source: Finnish Association of Mutual Funds

The Finnish mutual fund market has experienced a period of tremendous growth during the last ten years. The value of assets under management in the Finnish funds was approximately ten times bigger in 2005 than just seven years before in 1998. The average yearly growth rate of the Finnish mutual fund market during the last ten years has been 48 %, an exceptionally high rate compared to the European average of 15 %. In 2005, the yearly inflows into the Finnish funds (€ 7.4 billion) exceeded the size of the market in 1998, another indication of the immense growth of the market. Between years 2000-2002, the market did not display large

growth rates. The time period was characterised by movement of the assets from equity and balanced funds to fixed income funds as discussed in the introduction.

Simultaneously to the growth in the invested capital, the number of funds in the Finnish market has increased considerably. The total number of funds registered in Finland was 54 in 1995, whereas at the end of 2005 the number of Finnish funds had grown to 430. Taking all the funds marketed in the Finnish mutual fund market into consideration, the total number of funds amounted to 965 at the end of 2005 from which 535 funds were in foreign registry. The number of investors in the market has also grown significantly. Mutual funds registered in Finland had 58 104 unit holders at the end of 1995. In ten years, the number has grown to 1 869 673 unit holders at the end of 2005. Since research has shown that an average investor holds two to three fund units, the Finnish Association of Mutual Funds assumes that there are approximately 700 000 investors in the Finnish mutual fund market. Private persons held 28 % of the € 44.7 billion invested in the Finnish mutual funds at the end of 2005. Mutual fund ownership has become more dispersed as the Finnish market has matured. In 1998, the wealthiest 10 % owned 72 % of the assets in mutual funds. By the end of 2004, the share of the wealthiest individuals had decreased to 58 %.

The mutual fund market in Finland is described by the dominance of mutual fund management companies owned by banks. At the end of 2005, the three largest retail banks in Finland (Nordea, Sampo and OKO) managed nearly 80 % of the assets at the market through their fund management companies. The bank dominance has been named as one of the key reasons why the proportion of deposits in the financial assets of Finnish households has remained high. However, in European comparison Finnish investors do not hold their wealth unproportionately in deposits. In 2002 Finnish households held 34 % of their financial assets in deposits, which is equal to the Euro zone average. For example in countries like Germany (36 %), Spain (42 %) and Austria (56 %) the proportion of deposits was considerably larger according to Eurostat.

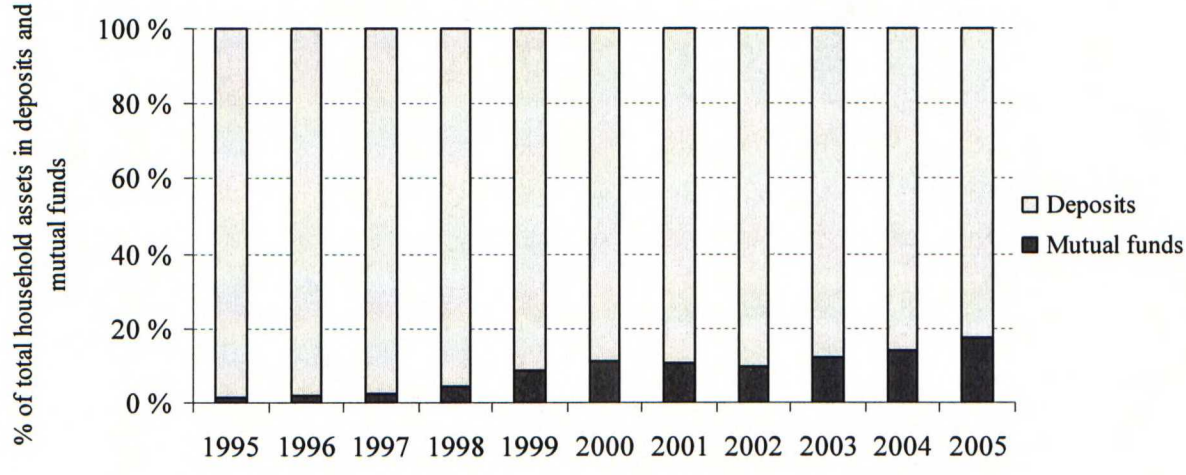
Although deposits have remained the main form of saving for the Finnish households, the relative importance of mutual funds as a saving form compared to deposits has grown as depicted by figure 2. According to a survey published by the Finnish Bankers Association on March 31 2006, Finnish bank directors were unanimous in stating their optimism towards increasing demand for stock and stock mutual fund investments. 65 % of the directors

expressed their belief in growing popularity of bond and fixed income fund investing. Contrary to the earlier surveys, the sentiment towards the growth of deposits was mixed. 30 % of the directors had positive outlook on deposits growth while 29 % expected decreasing demand for deposits. The change in the sentiment has been dramatic, since still in September 2005 half of the interviewed bank directors believed in the growing popularity of deposits.

Figure 2

Distribution of Finnish households' financial assets between deposits and mutual funds

The figure describes the division of financial assets held by Finnish households between deposits and mutual funds. The percentages refer to the total amount of financial assets held as deposits and mutual funds.



Sources: Finnish Bankers Association, Bank of Finland and Statistics Finland

Despite the fast growth, the Finnish mutual fund market is still small in European comparison. The assets under management account for 0.7 % of the total assets in the European mutual fund market. If the mutual fund market size is measured on relative rather than absolute basis by asset values per capita, Finland's position improves, though still remaining slightly behind the most developed mutual fund markets in Europe. With an approximate asset value of € 8 500 per capita the mutual fund market in Finland is clearly smaller than the largest European market of France with € 21 000 worth of assets per capita. The equivalent figures for Germany, U.K and Sweden are € 12 000, € 11 000 and € 12 000 respectively. In the U.S the value of assets under management per capita is slightly higher than in France, approximately € 23 000.

3. LITERATURE REVIEW

This chapter reviews the prior research on performance persistence and external fund growth. In addition to fixed income funds, the existing literature for equity and balanced funds is discussed. Findings from the Finnish studies are presented in separate sections.

3.1 PERFORMANCE PERSISTENCE STUDIES

This section presents the existing literature on the performance persistence of mutual funds. Before presenting the results with respect to fixed income fund performance persistence, the next subsection introduces the key findings for equity and balanced funds. The majority of the prior research is concentrated on investigating solely the performance of equity funds and is, if not stated otherwise, of U.S origin.

Studies on mutual fund performance persistence have differences in three aspects: the performance measures and methodologies used and the treatment of survivorship bias. Majority of the literature considers both raw and risk adjusted returns. Those studies that use risk-adjusted returns most often employ unconditional measures of performance. A number of papers incorporating conditional performance measures have been published recently. Performance persistence studies commonly apply at least one of the following methodologies: cross-sectional regressions, performance-rank tests and contingency tables. In cross-sectional regression analysis prior periods' performance is regressed over the following periods' performance. Of the two non-parametric methodologies, performance-rank tests examine whether the fund rankings are preserved over time. Contingency tables constitute a methodology in which funds are categorised as winners or losers over successive periods. The tables show the frequency with which winners and losers repeat. Survivorship bias can have a serious effect on the validity of performance persistence studies. The prior research on performance persistence can be divided into two broad categories: to those studies which discuss and/or eliminate the effect of survivorship bias on the results and to those that completely ignore the impact of survivorship bias. The early research did not put emphasis on survivorship bias, but the trend in later studies has been towards evaluating or eliminating the effect of survivorship on the validity of the results.

3.1.1 Equity and balanced funds

The majority of the existing literature is concentrated on investigating the performance persistence of equity or balanced funds and is mostly of U.S origin. Some of the studies presented in this subsection have included some fixed income funds into their samples, but the investigation is primarily concentrated on equity or balanced funds.

In his seminal paper, Sharpe (1966) was among the first ones to discuss the performance persistence of mutual funds. He compares the performance rank orders of 34 mutual funds based on Sharpe ratios. Sharpe uses data from the period 1944-1953 to predict the rankings between years 1954 and 1963. He concludes that performance differences can be predicted, although imperfectly. Unlike Sharpe, who studies the persistence of relative fund performance, Jensen (1968) examines the persistence of abnormal fund performance measured by Jensen alpha. For his sample of 65 funds Jensen uses the same length of evaluation and investment period than Sharpe, but for different times. He reports positive correlation in the performance between the evaluation and the investment period indicating that funds may have the tendency to be consistently superior or inferior performers. The positive correlation between the two periods is mainly due to persistence of inferior performance, which induces Jensen to emphasize carefulness in interpreting the results to mean that fund managers producing superior returns on one period are able to maintain their superiority on the following period. Later, e.g. Elton, Gruber, Das and Hlavka (1993), Brown and Goetzmann (1995), Carhart (1997) and Christopherson, Ferson and Glassman (1998) find that, consistent with Jensen, performance persistence is a result of consistent underperformance rather than overperformance.

As a part of their larger mutual fund performance evaluation Lehman and Modest (1987) study the persistence of fund rankings between periods 1968-1972 and 1973-1977. They use Treynor-Black appraisal ratios and total returns as performance measures and employ several regression models with varying number of factors. Statistically significant performance persistence, robust to the methodology and performance measure applied, is found for the sample of 130 funds. Christopherson and Turner (1991) report contrasting results by using asset pricing model in which market return is replaced by the so-called style index return. By employing this methodology Christopherson and Turner find no persistence in abnormal returns of equity funds. Similarly, Malkiel (1995) finds no consistency in returns during the

1980s, whereas he detects considerable persistence in equity fund returns during the 1970s. Sauer (1997) reports performance persistence for his sample of U.S equity funds from 1980 to 1992. The performance persistence was, however, no longer evident when Sauer partitioned the sample by the investment objectives of the funds.

Goetzmann and Ibbotson (1994) use time horizons from one month to three years to examine the power of evaluation periods of differing length to predict future performance. Their sample consists of 728 mutual funds, including bond funds, over thirteen-year period 1976-1988. The results indicate that past performance has predictive power on future performance for all considered time horizons. After Goetzmann and Ibbotson, Elton, Gruber, Das and Blake (1996) study the relationship between the length of the evaluation and the investment period. They use one year and three years as lengths for the evaluation and the investment periods. Elton et al. conclude that when future performance is evaluated over three-year period, evaluation period of three years contains at least as much information as one-year evaluation period. For one-year investment period, the selection of funds based on prior year's data conveyed much more information about the performance than the selection based on the data from prior three years.

Recent studies appear to suggest that conditional fund performance might have better capacity to detect persistence in performance. Christopherson et al. (1998) use both unconditional and conditional asset pricing models to predict the future returns of 185 institutional equity managers investing in primarily U.S equities. They find clear persistence in the relative performance of managers. Especially striking persistence is reported when conditional models are used. Further evidence consistent with Christopherson et al. is reported by Christopherson, Ferson and Turner (1999) and Otten and Bams (2002) for European mutual funds.

Otten and Bams (2002) investigate mutual fund performance in European markets with a survivorship bias controlled sample of 506 funds investing only in their domestic markets. Their study is focused on the markets of France, Italy, Netherlands, Germany and U.K. Otten and Bams find only weak evidence of performance persistence, except for the U.K funds, which show strong persistence in performance. For the other European markets Dahlqvist, Engström and Söderlind (2000) report no performance consistency for Swedish equity and balanced funds and, similarly, Christensen (2005) does not find evidence of performance persistence for Danish equity funds.

3.1.2 Fixed income funds

This subsection presents the prior research on the performance persistence phenomenon for fixed income funds. The studies are fewer in numbers than equity and balanced fund studies and are published mostly within the last 15 years. Recently, growing number of studies have provided evidence from markets other than the United States.

Among the first ones to study the persistence of fixed income mutual fund performance was Kritzman (1983). He conducts a cross-sectional regression analysis of each fixed income fund manager's percentile rankings for his sample of U.S mutual funds from the period 1972-1981. Fund returns are divided into two five-year periods and each manager's percentile ranking for both five-year periods is computed. Cross-sectional regression analysis is performed using the percentile rankings in the first five-year period as the independent variable and the percentile rankings in the subsequent five-year period as the dependent variable. Kritzman finds no evidence of performance persistence and concludes that evidence other than past performance is necessary to identify superior fixed income fund managers.

Ten years after Kritzman, Blake, Elton and Gruber (1993) conducted a comprehensive study of U.S bond mutual funds performance between 1979 and 1988. They consider two-samples of bond funds: one smaller sample designed to eliminate the potential impact of survivorship bias and a second larger, but biased, sample. Blake et al. note that there are fewer influences affecting bond funds than equity and balanced funds, which makes the likelihood of measuring and understanding their performance greater. Stock and balanced mutual fund performance evaluation is very sensitive to the index or indices used to measure performance (Lehman and Modest 1987 and Elton et al. 1993). Blake et al. show that modelling bond fund performance is simpler than modelling stock or balanced funds performance. They find bond fund performance to be robust across variety of models by employing altogether six different models ranging from single-index to six-index model. Their ten-year sample period is divided into two five-year periods and three three-year periods. Alphas from the index models are calculated for the sub periods. Adjacent periods' alphas are then used to compute rank correlations for each of the models. Overall, bond funds are found to underperform their relevant benchmark indices post expenses. The authors report no evidence of performance

predictability within the survivorship bias free sample. While all the used models produce broadly similar rankings of funds, none is useful in selecting funds that achieve higher rankings in subsequent periods. Some evidence of performance persistence is found within the biased sample. Blake et al. conclude that the persistence could result either from the larger size of the sample or from survivorship bias.

Kahn and Rudd (1995) use both regression analysis and contingency tables to evaluate the persistence phenomenon for equity and fixed income funds over the period 1986 to 1993. They measure performance as total returns, as cumulative style-adjusted returns and as the Treynor-Black appraisal ratios. Contrary to the findings of Kritzman (1983) and Blake et al. (1993) significant persistence in fixed income fund performance is reported in the cases of style adjusted returns and appraisal ratios. The detected persistence is beyond any effects of fund fees and expenses or data set survivorship bias. However, the persistence benefits could not cancel out the average underperformance of the fixed income funds resulting from fees and expenses.

The results obtained by Philpot, Hearth, Rimbey and Schulman (1998) offer further evidence of no consistency in fixed income fund performance. Performance inferences in their study are based on Sharpe ratio for a five-year holding period. Philpot et al. use regression based approach for their analysis of the investigation period 1982-1993. In addition to finding no evidence of past performance's ability to predict future performance, they find that bond fund managers are generally ineffective at increasing risk-adjusted returns. The authors argue that because bonds are fairly homogenous securities, bond fund managers have little opportunity to consistently outperform one another and thus, differentiate themselves. Consequently, the evidence of no performance persistence is consistent with their argument. By employing contingency tables and regression analysis Philpot, Hearth and Rimbey (2000) consider a sample of more heterogeneous bond funds. Their sample includes 73 non-conventional U.S bond funds (high-yield, global and convertible bond funds) over the period 1988-1997. The results indicate that short-term performance persistence is limited to the high-yield bond fund sub sample. No long-term performance persistence is observed. Philpot et al. (2000) conclude that although managers of non-conventional bond funds may face more diverse investment opportunities (than conventional bond fund managers) the performance of these funds does not show evidence of management skill or performance persistence.

Only a couple of studies have covered money market funds while examining the performance persistence phenomenon. In, to my knowledge, the first study to do so, Domian and Reichenstein (1998) examine the performance of U.S. money market funds from 1990 through 1994. Funds are divided into two categories: U.S government-only funds and other taxable money funds. Government-only funds are found to underperform relative to the other funds. Domian and Reichenstein calculate Spearman rank correlation coefficients for consecutive years and the percentages of winning funds that repeat as winners[6]. Their results indicate that money market funds relative returns exhibit strong persistence. From 1990 through 1993 every fund that produced top five net return in one year produced a top quintile net return in the following year. Funds with consistently lower expense ratios are found to produce consistently higher returns. The authors discuss the effect of survivorship bias on their results and conclude that it is not likely to be a major problem. Domian and Reichenstein state that since the relative money market returns are easily predictable, individual investors should not settle for a slightly above median return, but instead should try to pick up a top-returning fund.

Around and after the turn of the century, a number of studies examining the performance persistence phenomenon in other markets than U.S, mainly European, have emerged. Maag and Zimmermann (2000) reported findings for German bond funds simultaneously with Dahlqvist, Engström and Söderlind (2000) for Swedish bond and money market funds. Maag and Zimmermann measure performance by estimating unrestricted single and multi-index models as well as an asset class factor model for the period 1987-1996. Similarly to Blake et al. (1993) most bond funds are found to exhibit statistically significant negative performance with respect to their benchmark indices. Further consistent with Blake et al. the results were robust across different models and index specifications. By applying Spearman rank correlation test Maag and Zimmermann find no clear evidence for or against performance persistence in German bond funds. However, they infer from the results a tendency, yet inconclusive, for positive persistence, which is at least partly attributable to substantial deviations from investment benchmarks by certain funds. Unfortunately, Maag and Zimmerman do not put any emphasis on the effects of survivorship bias, caused by their sampling criterion, on their results.

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[6] In the study a winning fund is defined as any fund that earns a net return above median.

Dahlqvist, Engström and Söderlind (2000) investigate the performance and characteristics of Swedish mutual funds over the period 1993-1997. They measure performance as the alpha in a linear regression of fund returns on several benchmark assets. Again, bond funds underperform their benchmark assets. The underperformance is even stronger for money market funds. Consistent with earlier studies, the findings are robust to the benchmarks used. Dahlqvist et al. report no evidence suggesting performance persistence in bond fund performance. The results for bond funds are in sharp contrast to those for money market funds. A robust persistence in money market fund performance is reported. The persistence is found to concentrate on winners: the reported probability to remain a winner is 0.35, whereas the probability to remain a loser is 0.25. Inconsistent with Domian and Reichenstein (1998), the results are not driven by management fees. Instead the results are even stronger when administrative fees are not debited against funds' net asset values. Dahlqvist et al. show that their findings with respect to bond and money market funds should not be subject to survivorship bias.

Hallahan's (1999) study on the content of portfolio performance history and persistence in Australian rollover funds' performance is one of the few papers covering the markets outside Europe and the United States. Hallahan employs the three most common methodologies (regression analysis, contingency tables and performance-rank tests) to study the fund returns over the period 1989-1995. He finds regression analysis providing evidence in support of performance persistence for fixed interest funds, especially when performance is measured by Jensen alpha. Contingency tables report further evidence of persistence in risk adjusted performance, whereas raw return analysis reveals patterns of strong performance reversals during the observation period. Consistent with the results for the other two methodologies, Hallahan finds performance-rank based tests to show strong evidence of persistence in risk adjusted performance of fixed interest funds. For fixed interest funds, no evidence was reported that would suggest a relationship between the information content of portfolio performance history and its' length. Hallahan briefly considers the effect of survivorship bias by incorporating Treynor-Black appraisal ratio as one of the performance measures in the regressions. The results for fixed interest funds indicate that survivorship bias does not affect the detected performance persistence relationship. However, the extremely high attrition rate (32 %) of fixed interest funds in Hallahan's sample would require further measures to examine the effect of survivorship bias, in order to alleviate the concerns over the validity of the reported results.

Recently, Silva, Ceu Cortez and Armada (2005) investigate the persistence of European bond fund performance using both conditional and unconditional measures of performance. The authors employ regression analysis and contingency tables to examine their data set of 638 bond funds from Italy, Spain, France, Germany, U.K and Portugal. They divide the overall sample period (1995-2000) in two consecutive sub periods of three years. Data on non-surviving funds is not included in the data set and thus, the results are subject to survivorship bias. Silva et al. do not apply any methods to quantify or alleviate the effect of survivorship bias on their results. Their empirical evidence suggests consistency in European bond fund performance, particularly in the case of Spanish, French and, contrarily to Maag and Zimmermann (2000), German bond funds. The strength of the evidence decreases when they consider conditional alphas, particularly for multi-index model, indicating that some of the observed persistence phenomenon is driven by time-varying betas. Furthermore, Silva et al. find that the persistence is concentrated within the poor performers. In another recent study Christensen (2005) examines the performance of Danish Mutual funds. He reports weak evidence in favour of fixed income fund performance persistence. Similarly to Silva et al. the persistence appears to be concentrated to the worst performing funds.

3.1.3 Finnish studies

The Finnish mutual fund market has been subject to increasing number of studies during the recent years. Due to the relatively young age of the market the early research suffered from scarcity of observations. Later studies have been able to incorporate larger data sets but still the number of funds included in them has remained rather low. Studies examining fixed income funds in the Finnish market are scarce. This section reviews literature on the performance of Finnish mutual funds and its' persistence.

The first mutual fund study in Finland was conducted by Kasanen and Kinnunen (1990). Their sample consisted of 11 funds during the two-year investigation period 1988-1989. The results indicate underperformance by Finnish mutual funds compared to the benchmark index. After Kasanen and Kinnunen, Heikkilä (1993) measures the performance of Finnish mutual funds for the next two years (1990-1991) and finds consistent results with the earlier study. Liljeblom and Löflund (1995) focus also on assessing the performance of Finnish funds

against the same benchmark and study additionally whether the funds had performed persistently. Neither market timing abilities nor performance persistence is detected, although the data used was survivorship biased.

Sandvall (1999) investigates the performance persistence of Finnish mutual funds for three different fund categories (equity, balanced and bond funds) over three-year period 1995-1998. He forms winner and loser portfolios on the basis of funds' Jensen alphas for prior ranking period of six months. Then he follows the weekly cumulative abnormal risk-adjusted return of the funds for holding period of six months. Sandvall finds evidence of performance persistence for all three fund types. Pätäri (2000) discusses Sandvall's findings and notes that "due to the methodological choices of the author the results have to be considered with a provision". By recalculating some of Sandvall's work Pätäri (2000) demonstrates that the author's conclusion of statistically significant persistence in Finnish mutual fund performance cannot be considered very conservative at any rate.

Pätäri (2000) himself studies the performance persistence of Finnish equity funds as a part of his Doctoral Thesis. The data consists of survivorship bias free sample of 14 equity funds that have data for the whole observation period 1994-1998. Pätäri uses varying evaluation and investment period lengths ranging from one to four years to evaluate the performance relationship over time. He employs a set of seven performance measures, in which the estimation of investment risk is based on total risk, to compute altogether 20 performance indices for each sub period of the study. Funds are ranked based on each performance index and Spearman rank correlation coefficients calculated for every pair of evaluation and investment period. Pätäri obtains results that do not support the existence of performance persistence for Finnish equity mutual funds. At 95 % confidence level none of the rank correlation coefficients is statistically significant and only five out of 400 computed coefficients reach statistical significance at 90 % level.

Three recent Master's Theses have explored the performance of Finnish Mutual Funds. Sailas (2001) studies the predictive ability of the Morningstar and HexStar ratings with respect to mutual fund performance during the period 1991-2001. These measures are not found to offer superior forecasting ability over alternative predictors. Vaittinen (2002) investigates Finnish equity funds' returns from 1991 to 2001. His results indicate that during the investigation period positive mean returns could have been achieved by using momentum, value and size

strategies. Short-term performance persistence, driven by winner funds, is also detected. Uljas (2004) examines the performance of actively managed corporate bond funds in Finland. He finds corporate bond funds outperforming the other mutual fund groups between the years 2002 and 2004. In addition, Uljas does not find active management to improve the performance of an average corporate bond fund. However, high-yield bond fund managers were able to beat the market during the investigation period.

3.1.4 Summary

Altogether, the research carried out to date suggests that money market funds seem to be able to perform persistently. This phenomenon is partly attributable to money market funds' stable expense ratios, which cause low-cost funds to produce consistently better returns. The evidence for equity and balanced funds is not as conclusive as for money market funds, but still a majority of the research reports some level of performance persistence. Up to date, the least evidence in favour of performance persistence is reported for bond funds. Still, some evidence of performance persistence for bond mutual funds is available. Many of the mutual fund studies, especially of fixed income funds, either completely disregard the impact of survivorship bias on the results or consider its' effect narrowly.

3.2 FLOW DETERMINANT STUDIES

What mutual fund attributes create the variation in external fund growth has been a widely addressed research question during the last 15 years. Similarly to mutual fund performance literature, a large majority of the research deals with equity funds and is almost entirely concentrated to U.S funds. Most of the research is conducted with linear regression analysis, though some of the early studies employ simpler correlation analysis. Fund flows are measured, in the vast majority of the literature, as the growth rate of funds assets net of holding period return (percentage flows) rather than the monetary amount of net flows (monetary flows). The primary reason for this is to alleviate the effect of fund size on the results presuming that larger funds tend to receive higher flows. The few studies that use fund size as a dependent variable control for the size effect in the regression model and therefore, measure flows in monetary terms. The following sections review the findings from earlier literature for equity funds, fixed income funds and Finnish mutual funds separately.

3.2.1 Equity funds

Of the early studies on external fund growth determinants, Spitz (1970) investigates the relationship between fund performance and net cash inflows, the so called *performance-flow relationship* (PFR). His sample consists of twenty U.S mutual funds during the period 1960-1967. He uses simple and multiple correlation analysis and detects a weak relationship between the money flows into the funds and their performance. Using a larger sample consisting of 74 equity mutual funds and longer time period (1945-1964) Smith (1978) finds weak evidence of performance-flow relationship consistent with Spitz. Smith reports positive performance increasing external fund growth. He evaluated the fund performance by Jensen alpha and Forbes performance measure and found Jensen alpha exhibiting stronger PFR. In a later study Ippolito (1992) provides further evidence in favour of PFR by examining the relationship over the period 1965-1984. He finds that investors redirect their mutual fund investments from poorly performing funds to recent good performers.

Sirri and Tufano (1998) provide an extensive study on the inflows and outflows to U.S equity mutual funds during the period 1971-1990. They measure fund growth with percentage flows. Sirri and Tufano report further evidence on consumers' tendency to direct their investments into the best performing funds. Interestingly, they find the performance-flow relationship to be asymmetric: investors flock disproportionately to high-performing funds while failing to flee lower performing funds at the same rate. This asymmetry might be explained by their finding that funds that spend the most on marketing enjoy a much stronger PFR than their rivals. The finding is consistent with the hypothesis that consumers search costs affect mutual fund flows. Sirri and Tufano provide further evidence on the role of search costs by reporting some evidence that media coverage is related to faster fund growth. Additionally, belonging to a large family of funds, which supposedly decreases search costs, had a positive impact on external fund growth. Further evidence on the impact of fund family on fund growth is provided by Nanda, Wang and Zheng (2004), who report that superior performance by a fund not only increases the flows to that fund, but also to other funds in its' family. Consistent with asymmetrical PFR, Nanda et al. do not find a badly performing fund to decrease the flows into its' family of funds.

Sirri and Tufano (1998) show fund expenses and changes in them to be negatively related to flows, whereas changes in load fees have no effect on flows. They conjecture that higher load

fees make funds less attractive for investors but motivate sales representatives to sell more aggressively, since load fees are used to compensate them. The findings of Sirri and Tufano suggest that these two opposite effects cancel each other. Elton, Gruber and Blake (2003) apply regression model developed by Sirri and Tufano and find funds with incentive fees receiving more new cash inflows than non-incentive fee funds, ceteris paribus.

The effect of expenses on mutual fund flows is investigated thoroughly in a recent study by Barber, Odean and Zheng (2005). They employ a comprehensive data set of U.S equity funds starting with 465 funds in 1970 and ending in 1998 with 3 533 funds. Fund growth is measured by quarterly percentage flows. The results indicate stronger investor sensitivity towards salient in-your-face fees, like front-end loads and commissions than towards operating expenses. In fact, Barber et al. find at best no relation and at worst a perverse positive relation between fund flows and operating expenses. By separating the effect of operating expenses dedicated to marketing Barber et al. find the results for operating expenses to be driven by a positive relationship between fund flows and fund marketing.

Similarly to Sirri and Tufano (1998), Barber et al. (2005) provide evidence that mutual fund marketing does work. Additionally, Jain and Wu (2000) document that 294 mutual funds, which advertised in Barron's or Money Magazine, grew faster than a control group of funds with similar performance prior to the advertising period. Further consistent with Sirri and Tufano, Barber et al. detect a negative relation between total expenses and fund flows. They also investigate differences between experienced and first time buyers of mutual funds. They find experienced buyers choosing funds with much lower loads than first time buyers, but not with lower operating expenses. Barber et al. results also indicate that experienced investors put less weight on a fund's prior performance than first time buyers.

Del Guercio and Tkac (2002) compared the determinants of fund flows between mutual and pension funds in the United States. The comparison is of interest, since the profiles of the investors in the two fund markets are different: pension fund investor has arguably more financial expertise according to the authors. Del Guercio and Tkac use both monetary flows and percentage flows in their analysis. Contrary to Sirri and Tufano (1998) and their own findings for mutual fund investors, Del Guercio and Tkac find pension fund investors withdrawing their investments from poorly performing funds and not flocking disproportionately to recent winner funds. They further conjecture that unlike pension fund

investors, mutual fund investors tend to shuttle money to the same funds year after year without further scrutiny beyond the initial decision. Pension fund investors are found to evaluate funds based on risk adjusted measures like Jensen alpha, whereas mutual fund investors use unadjusted raw return performance. Del Guercio and Tkac report that mutual funds attract new money approximately in proportion to their size. In contrast, large pension funds are found to attract considerably less inflows of money compared to their smaller counterparts.

Based on the above reviewed literature the performance-flow relationship appears to be positive and of convex shape rather than linear. Convex shape of PFR refers to investors' tendency to direct funds disproportionately to the best performing funds while not withdrawing funds from the worst performers. Disposition effect[7], investors' reluctance to realize losses and sell the worst performers in their portfolios, has been suggested as one reason for the convexity of the PFR (Sirri and Tufano 1998).

Chevalier and Ellison (1997) report further evidence on positive convex PFR and interpret it as an incentive scheme given by mutual fund investors to mutual fund companies. They investigate a set of U.S growth and growth income funds for the period 1982-1992. The incentives are found to commit fund companies to change the risk levels of their funds accordingly with the PFR in order to finish the year (presumed to be the point of performance evaluation) among the top performers or avoid the list of worst performers. Chevalier and Ellison find the strongest incentives for funds that are well ahead of the market in an attempt to finish the year among the top-performers. Also, fund risk levels are either increased or decreased in an attempt to avoid the worst performers list. Later finding of Del Guercio and Tkac (2002), showing that mutual fund investors use primarily raw returns to measure the performance of funds, provides further indication of the incentives of fund managers to "play" with the risk of their fund before the time of performance measurement. The "play" with the risk might not, however, be entirely free. Sirri and Tufano (1998) report a marginally significant negative relationship between volatility of fund returns and external fund growth.

3.2.2 Fixed income funds

[7] On disposition effect see e.g. Shefrin and Statman (1985) and Grinblatt and Han (2002).

Considering that first studies on the determinants of external mutual fund growth date back some 30 years, it is surprising that only Zhao (2005) has investigated bond fund flow determinants. I am aware of one Finnish Master's Thesis (Thorén 1998) that has covered the topic, but to my knowledge Zhao's work is the only published study on the bond fund determinants. Up to date, no studies have examined the determinants of flows to money market funds as far as I am aware. This section will present Zhao's findings while the following section will discuss the aforementioned Master's Thesis among other Finnish studies on mutual fund flow determinants.

Zhao uses CRSP Survivorship-Bias Free US Mutual Fund Database to create a set of quarterly data from the first quarter of 1992 to the third quarter of 2001. The data set comprises of 5 554 open-end bond funds. Similarly to the majority of the studies discussed in the preceding section, Zhao employs cross-sectional time-series regression to examine the flow determinants of his fund sample. The flows are measured in monetary and percentage terms, but Zhao concentrates his analysis on the monetary flow measure to address practitioner concerns about what determines how investors direct their investment dollars. He considers findings for the whole sample and sub samples of six different bond fund types.

Inconsistent with Del Guercio and Tkac (2002) findings for equity fund investors, Zhao reports bond fund investors directing their investment dollars to recent performance leaders on risk-adjusted basis rather than on the basis of raw returns. Similarly to equity fund investors, the performance flow relationship appears to be positive and convex for bond fund investors. Zhao divides the funds into performance quintiles and shows that risk-adjusted performance measures exert strong effect on flows only in the top performance quintile. In striking contrast to equity investors, bond fund investors are not found to invest disproportionately more in the raw return leaders. Additionally, bond fund investors seem to chase absolute performance rather than relative performance, a finding consistent with prior literature indicating no conclusive evidence of bond fund performance persistence. There is a positive relationship between the previous and current flows to funds in Zhao's sample.

Contrary to the inconclusive evidence for equity fund investors from the prior studies, Zhao's results indicate that bond fund investors understand well the erosive effects of expenses on the fund returns. Most bond fund investors are found to avoid funds with high operating expenses and sales loads. The results are consistent with Barber et al. (2005) by showing stronger

investor sensitivity towards front-end loads than towards other load structures. In contrast to the results for other sub samples, high-yield bond fund flows are positively affected by the presence of loads. According to Zhao this indicates that investors are likely to rely on the assistance of brokers and financial advisors in pursuing risky investment objectives. Zhao reports small bond funds achieving higher dollar growth than large funds. This result does not apply to high-quality bond funds. Consequently, smaller funds have superior growth rates. Consistent with Sirri and Tufano (1998) for equity funds, bond funds from larger fund families experience higher external growth. The results, however, suggest that funds from fund families specialising only in bond funds do not necessarily receive higher flows than funds from less specialised fund families. Finally, Zhao finds poor long-term equity market returns to increase investments into less risky bond fund categories.

3.2.3 Finnish studies

The literature on the Finnish mutual fund flows is limited to a few Master's Thesis and a one study by Kasanen, Lipponen and Puttonen (2001) published in the Finnish Journal of Business Economics. This section presents the key findings of these studies.

Kasanen et al. (2001) study the determinants of mutual fund growth for 17 Finnish equity funds during the period January 1994 through April 1996. They focus on the standpoint of mutual fund supplier in detecting mutual fund investors' fund selection criteria. From this standpoint Kasanen et al. concentrate their analysis on investigating performance-flow relationship and the effect of fees, advertising and provided services on the fund flows. The sample is partitioned into funds distributed by mutual fund companies owned by banks and non-bank funds. Consistent with international literature, Kasanen et al. find non-bank funds to exhibit a positive convex shaped PFR. Best performing funds attract largest inflows while investors do not withdraw funds in the same proportion from the worst performers. Kasanen et al. findings indicate that performance-flow relationship does not exist for bank related funds. It seems that Finnish banks exploit their customer loyalty and extensive distribution networks to sell their funds on other arguments than performance. The authors do not consider the effect of distribution channel on the overall fund flows.

Using a longer time period spanning from March 1994 to December 2001 Torkkeli (2002), in her Master's Thesis, finds external fund growth of Finnish equity funds to be unrelated to the bank relation of the fund. She reports a positive asymmetric PFR indicating, contradictory to Kasanen et al., that also funds distributed by banks exhibit a positive performance-flow relationship. Knuutila (2005) studies the effect of Morningstar ratings on Finnish mutual fund flows in his recent Master's Thesis. He finds no clear indication that Morningstar ratings would affect Finnish mutual fund flows. Instead evidence consistent with Kasanen et al. with respect to PFR is reported. Non-bank funds exhibit a positive performance-flow relationship, whereas PFR is non existent for bank funds in Knuutila's sample.

Kasanen et al. (2001) do not find any relationship between external fund growth and management or load fees. This would suggest that Finnish mutual fund investors are insensitive to expenses. Torkkeli (2002), however, finds front-end load fees affecting flows to bank related funds positively while back-end load fees have the similar effect on non-bank funds. Torkkeli's findings suggest that there are differences in the sensitivity towards expenses between consumers investing in bank related and non-bank funds. Also, the compensation schemes of bank fund sales representatives might be designed to encourage the sales of front-end loads as suggested by Sirri and Tufano (1998). Torkkeli does not report any size effect for bank related funds. Therefore, the amount of assets under management does not affect the growth of bank funds. In contrast to bank funds, smaller non-bank funds attract the largest investments. Partly consistent with international evidence, the results of Kasanen et al. also indicate that advertising has a positive impact on mutual fund flows during positive aggregate demand. This impact does not hold during times of negative aggregate fund demand.

In her Master's Thesis, Thorén (1998) studies the flow determinants to Finnish equity, balanced, bond and money market funds by examining monthly flows to each fund class. Her findings provide the only direct point of comparison with respect to the flow determinant study of this thesis. The span of the time interval in her study starts from April 1994 ending to February 1998. Due to the scarcity of funds in the market the examination of money market funds is limited to the period May 1996-February 1998. In the beginning of the investigation period the bond fund (money market fund) sample comprises of 6 (5) funds growing to 15 (15) funds at the end of the period. Thorén considers the effects of performance, expenses, volatility, size, previous flows and distribution channels on fund flows.

Equity and balanced funds in Thorén's sample show positive performance-flow relationship robust to the performance measure used to evaluate performance. Additionally, a negative relationship between fund size and external fund growth is documented for equity and balanced funds. At 10 % significance level the negative size effect is detected also for money market funds. Consistent with the later findings of Kasanen et al. (2001), management fees and load fees have no effect on fund flows. Thorén finds external fund growth of previous months affecting the fund flows positively among all fund categories. The channel, through which a fund is distributed, only affects the flows to balanced funds. Bank related balanced funds experience lower external fund growth than their non-bank counterparts. An opposite distribution channel effect to balanced funds is found for bond and money market funds, but it remains statistically insignificant.

3.2.4 Summary

Overall, the prior flow literature seems to agree that there exists a positive convex shaped performance-flow relationship. Equity fund investors appear to measure performance on pure raw return basis, whereas bond fund investors use risk-adjusted performance measures to evaluate funds. Bond fund investors are found to be more sensitive to expenses than equity fund investors. Both investor groups, however, seem to be more sensitive to fees that are charged at the point of investment, like front-end loads, than to fees charged upon funds withdrawal. Belonging to a large family of funds has been shown to contribute to the external fund growth. Marketing efforts of funds have also proven to be advantageous in attracting new investments into the funds. So far, the determinants of money market fund growth have remained unexplored.

4. DATA

This chapter introduces the fund and index data used in this thesis and discusses the existence of survivorship bias in the sample.

4.1 FUND DATA

The performance persistence study of this Master's Thesis includes observations from 122 bond funds and 36 money market funds in the Finnish mutual fund market between the years 1995-2004. 54 Finnish bond funds and 33 Finnish money market funds are covered in the flow determinant study. The data sets used in the studies consist mainly of the information provided in the Finnish Association of Mutual Funds' monthly Mutual Fund Reports produced by Sijoitustutkimus. The age of the Finnish mutual fund market and the availability of data provide natural limitation to the length of the investigation period. Transfers of mutual funds or name changes are treated as a continuation of the original fund. Information about the transfers or name changes was obtained from the press releases of the mutual funds and Sijoitustutkimus and the annual reports of mutual funds.

The first ever produced Mutual Fund Report dates back to September 1993. This report provided data on one money market fund and two bond funds. Due to the scarcity of bond and money market data in the earliest Mutual Fund Reports data from 1993 and 1994 for bond funds and additionally from 1995 for money market funds had to be excluded from the performance study. The length of the flow determinant study had to be restricted to begin from the year 1994, since funds' relative performance is examined as a one possible flow determinant. In order to be included in the performance study, a fund had to have at least two years of return data. Of the total 158 bond funds in the data set, 36 funds did not meet this criterion. 8 out of 44 money market funds in the data set were excluded from the study due to lack of return data.

The data set covers both the funds registered in Finland and the funds of foreign registry available in Finland and reported in the Mutual Fund Reports. Funds of Finnish and foreign registry are included in the performance study. However, the funds registered outside Finland are excluded from the flow study. In addition to studying performance persistence, the aim of this Master's Thesis is to analyse the determinants of external fund growth for Finnish fixed income funds. Therefore, the funds registered outside Finland are excluded from the analysis.

Monthly total returns[8] of funds reported in the Mutual Fund Reports are used for the performance analysis. Asset flow, fund size, expense data and other quantitative and qualitative determinants are used for the flow analysis.

4.2 INDEX DATA

Data from altogether five different indices is used in this thesis. The index data is employed in building one and three-factor models for mutual fund performance evaluation. Data for the following indices was obtained from Thomson Financial Datastream:

MSCI Euro Credit
MSCI Euro Credit Government
MSCI Euro Credit Corporate
MSCI World Sovereign Debt
Merrill Lynch Euro High Yield

Finland's 10-year benchmark bond values were obtained from the same source as index data and Euribor and Helibor rates from the Bank of Finland's internet page.

4.3 SURVIVORSHIP BIAS

Some funds in the data set do not have data from the moment they were included in the Mutual Fund Reports until the end of 2004. There are two reasons for this:

1) fund ceases to exist, is merged into another fund managed by the same fund company or acquired by another fund company during the time period of the study.
2) reporting about fund in the Mutual Fund Reports is stopped for some reason other than termination or acquisition of the fund.

[8] In this thesis the terms total return and raw return refer to the returns displayed in Mutual Fund Reports. These returns are calculated net of management expenses.

The funds registered in Finland, which were subject to exclusion from the Mutual Fund Reports were excluded due to reason number one. In fact, none of the Finnish funds in the sample ceased to exist but were either merged into another fund or acquired by competing fund company. The reasons for the exclusion could not be traced for all excluded mutual funds of foreign registry, but it seems that most of these funds were excluded from the reporting based on reason number two[9]. Table 1 reports the number of funds excluded from the Mutual Fund Reports per year, fund category and reason number.

Table 1

Yearly breakdown of reasons for excluding a fund from the Mutual Fund Reports

Numbers reported for the funds included in the data set of performance persistence study. Reason no. 1 refers to funds, which were excluded from reporting due to closure, merger or acquisition. Reason no. 2 reports the number of funds, which were excluded from reporting without giving any specific reasons for the exclusion. Number of funds shows the amount of funds included in the entire data set. Attrition rate tells the percentage of total funds excluded from reporting for each reason and fund category.

	Reason no. 1		Reason no. 2	
Fund Type	Bond	Money market	Bond	Money market
Year				
1995	0	0	0	0
1996	0	1	0	0
1997	1	1	0	0
1998	0	0	0	0
1999	1	0	0	0
2000	3	0	0	0
2001	0	0	0	0
2002	2	2	6	0
2003	2	0	4	0
2004	4	1	3	0
Total	13	5	13	0
Number of funds	122	36	122	36
Attrition rate	11 %	14 %	11 %	0 %

Survivorship bias refers to the notion that mutual funds, which do not survive are, in general, those funds that have performed poorly. This will inflate the average performance of the remaining funds and enhance their performance persistence. Fund disappearance, or attrition, can lead to two distinct but related problems, survivorship bias and *look-ahead bias*. Survivorship bias is the effect of including in the sample only the funds extant at the end of the sample period. Look-ahead bias is the effect of requiring funds to survive some minimum

[9] The press releases of Sijoitustutkimus only informed that the fund was excluded from Mutual Fund Reports. In the other cases where a fund was merged or acquired Mutual Fund Reports provided information about the event. An internet search for some of the funds of foreign registry provided evidence that these funds continued to exist even though they were excluded from reporting in Mutual Fund Reports.

length of time by trimming funds that perish during a look-ahead period. The methodologies used in this study do not cause look-ahead bias. All funds, irrespective of whether they survived until the end of the study period, are included in the sample. Therefore, the initial data set is not subject to survivorship bias. The methodologies applied in this study require a fund to exist from the beginning until the end of the examination period. Thus, some of the tests in this thesis may be affected by survivorship bias.

The data provided in table 1 assist in evaluating the possible effect of survivorship bias on the results. The respective attrition rates[10] for bond and money market funds based on fund closure, merger or acquisition are 11 % and 14 % for the whole period[11]. Attrition rates of this magnitude can cause severe survivorship bias in the results. The time frame, during which period to period performance persistence is studied, ranges from two years to six years. The number of funds excluded from reporting due to reason number one remains small for two-year time frames. Basically, the number of excluded funds is so high that the results could be influenced by it only during the six-year time frame 1999-2004. Methodology that provides evidence on whether this is the case is employed in the performance persistence study of this thesis. Furthermore, theories that help in detecting survivorship bias are applied in the results section of Chapter 5.

Previous research suggests that survivorship bias has less impact on bond fund performance compared to stock funds (Blake et al. 1993, Dahlqvist et al. 2000 and Ayadi and Kryzanowski 2004). According to Blake et al. this may be due to the stability in bond fund performance. The effect of survivorship bias on money market funds is not, to my awareness, documented in the literature, but one would expect it to be even lower than for bond funds, since money market fund performance can generally be considered to be more stable than bond fund performance.

5. PERFORMANCE PERSISTENCE OF FIXED INCOME MUTUAL FUNDS IN FINLAND

[10] Attrition rate refers here to the percentage of funds that were closed, merged or acquired in the sample of funds included in the study.

[11] In addition, one fund changed its investment policy and thus, fund category during the investment period. The fund was excluded from the sample after the change in its' investment policy.

This chapter presents the performance persistence study of this Master's Thesis. First, the examined hypotheses and employed methodologies are explained followed by an analysis of the empirical results.

5.1 HYPOTHESES

This chapter studies the performance persistence of Finnish fixed income mutual funds. The analysis of performance persistence is conducted by examining the truthfulness of the following two hypotheses for bond and money market funds in the Finnish mutual fund market.

Hypothesis I:
H_0: The performance of a fund on a certain period is independent of its' performance in the prior period.

Hypothesis II:
H_0: Information content of prior period performance is invariant to the length of the observation period of prior performance.

Hypothesis that mutual funds, which have above average returns on a certain period will continue to produce returns above the average is called *hypothesis of performance persistence* (e.g. Otten and Bams 2002). It implies that some portfolio managers have above average skills in picking stocks or bonds into their funds. This phenomenon is called *"hot hands" effect*. Consistent better performance of some portfolio managers over others is inconsistent with *efficient market hypothesis*' notion that market prices of financial instruments reflect all available information. As Chapter 3 discussed, many studies have found consistency in equity mutual fund performance. However, there is less evidence of performance persistence for bond funds. This and further evidence of bond funds inability to beat passive indexes (e.g. Blake et al. 1993 for U.S bond funds and Silva, Ceu Cortez and Armada 2003 for European bond funds) leads Bodie, Kane and Marcus (2002) to conclude that fixed-income portfolio managers operate in a more efficient market than their colleagues managing equity funds. Therefore, based on efficient market hypothesis, my null hypotheses are that Finnish fixed

income mutual funds do not exhibit performance persistence and the information content of their prior period returns is independent of the prior period's length.

5.2 METHODOLOGY

The performance persistence of Finnish fixed income mutual funds is examined on the basis of monthly mean performance over a number of overlapping time periods of differing length. The lengths of the time periods under investigation vary from two-years to six-years. Comparison of results across different time periods gives not only information about how persistent, if at all, the performance of fixed income funds is, but it also sheds light upon the predictive power of past performance periods of differing length. The most thorough analysis is carried out by conducting Spearman rank correlation tests for 28 and 24 combinations of evaluation period and investment period for bond and money market funds, respectively. In order to gain additional insight to the relationship between a fund's recent and past performance, additional regression tests of performance persistence are conducted.

5.2.1 Performance measures

Altogether five performance measures are used to compare the performance of the funds under examination. Investigation of the results over multiple performance measures allows evaluation of the findings' robustness to the performance measure selected. Applied performance measures are the following: *total return*, *Sharpe ratio*, *reward-to-mean absolute deviation (RMAD)*, *Jensen alpha* and *multi-index performance measure*. Sharpe ratio and Jensen Alpha are commonly used performance measures and allow direct comparison of the findings with a wide spectrum of international studies. Additionally, the formulated multi-index measure presents a factor model to measure bond fund performance in Finland.

The terms total return and *raw return* are used interchangeably to refer to the unadjusted returns of funds. Sharpe ratio is not calculated for money market funds, since according to the Mutual Fund Reports it is not reliable measure for money market funds. Also, due to small variation in money market fund returns RMAD was omitted in money market fund investigation. Additionally, no multi-index model for money market funds was calculated, since their returns are mainly dependent on one factor: the prevailing short-term interest rate

level in the economy. To my knowledge, literature does not present multi-index models for money market fund performance measurement. Sharpe ratio, RMAD and Jensen alpha are defined as follows:

$$Sharpe\ ratio = (R_{it} - R_{ft})/\sigma_{it} \tag{1}$$

$$RMAD = (R_{it} - R_{ft})/MAD \tag{2}$$

where

$$MAD = \sqrt{\frac{\sum_{i=1}^{n} |R_{it} - R_i|}{n}}$$

$$Jensen\ alpha = (R_{it} - R_{ft}) - \beta_i\,(R_{mt} - R_{ft}) \tag{3a}$$

where

R_i = mean monthly return for mutual fund i;

R_{it} = monthly return for mutual fund i at time t;

R_{ft} = monthly return to Finland's 10-year benchmark bond at time t;

σ_{it} = standard deviation of monthly return for mutual fund i at time t;

β_i = systematic risk for mutual fund i;

R_{mt} = monthly return for MSCI Euro Credit Index

Money market funds are not measured by Jensen alpha, since for these funds the market benchmark index and the risk free rate are essentially the same rate in this case the Euribor rate. Therefore, a slightly modified performance measure from Jensen alpha is defined for money market funds and denoted as Alpha:

$$Alpha = R_{it} - \beta_i\,(R_{ft}) \tag{3b}$$

where

R_{ft} = 3-month Euribor index return return at time t[12]

The monthly yield on the Finland's 10-year benchmark bond is chosen as a risk-free rate, since it represents essentially risk-free investment for a Finnish investor. MSCI Euro Credit index is applied as a market benchmark index for bond funds. This index covers European

[12] Before the introduction of Euribor rates the corresponding Helibor rates are used.

government and corporate bonds with a weighting on the largest issuer countries. Therefore, it provides a good market benchmark index for European (Finnish) bond studies. The index is likely to be among the indices that closely match the aggregate of all funds in the sample of mutual funds in this study. Availability of data throughout the whole examination period provides additional reasoning why this particular index was chosen as a benchmark. Monthly returns for each fund are obtained directly from the Mutual Fund Reports. Ordinary Least Squares regressions are run to calculate betas (β_i) and Jensen alpha's (Alpha's) for each bond (money market) fund.

Sharpe ratio reflects the funds excess return over risk-free rate per unit of total risk. Reward-to-mean absolute deviation is a similar risk measure to Sharpe ratio, but it uses a measure of average risk as a surrogate for risk instead of total risk. Jensen alpha measures funds average performance in excess of the return indicated by capital asset pricing model in other words the abnormal return generated by the fund. Although initially applied to stock funds, these measures have also been extended to describe bond fund performance (e.g. Gudikunst and McCarthy 1992, Blake et al. 1993 and Gallo, Lockwood and Swanson 1997).

Jensen alpha assumes a well diversified investor and, therefore, is only concerned with systematic risk in mutual fund performance evaluation. As a result, it does not penalize mutual fund managers who are not fully diversified. A relevant measure of performance for investors who are not well diversified is Sharpe ratio. These investors are concerned with their total risk exposure rather than exposure to systematic risk. Sharpe ratio also reflects the level of mutual fund diversification.

The multi-factor model presented below is formulated to obtain the multi-index performance measure (*MI*). The benchmark indices are chosen to represent bond and corporate funds within Euro zone, bond funds investing outside Europe and bond funds, which invest in riskier high-yield bonds. The multi-index model is defined formally as follows:

$$MI = (R_{it} - R_{ft}) - [(1-d)\beta_1 (R_{1t} - R_{ft}) + d\beta_2 (R_{2t} - R_{ft}) + \beta_3 (R_{3t} - R_{ft}) + \beta_4 (R_{4t} - R_{ft})] \quad (4)$$

where

R_{it} = monthly return to mutual fund i at time t;

R_{ft} = monthly return to Finland's 10-year benchmark bond at time t;

R_{1t} = monthly return to MSCI Euro Credit Government index at time t;

R_{2t} = monthly return to MSCI Euro Credit Corporate index at time t;

R_{3t} = monthly return to MSCI World Sovereign Debt index at time t;

R_{4t} = monthly return to Merrill Lynch Euro High Yield index;

d = dummy variable, which obtains value 1 when mutual fund i is a corporate bond fund and value 0 otherwise.

Of the indices chosen for the model, MSCI World Sovereign Debt index is used to capture the influence of the population of funds holding bonds issued by institutions outside Europe. Merrill Lynch Euro High Yield index is introduced to examine the effect of holding low-quality bonds in a fund. Blake et al. (1993) found that incorporating an index for high-yield funds improved the results from their factor model. The MSCI Euro Credit Government/Corporate index is used to capture the influence of a large population of investment grade bonds. However, in order to avoid multicollinearity problems[13] in the regression specification, these two indexes cannot co-exist in the model when regressions are run. Therefore, a dummy variable (d) is introduced to determine, which one of the two indices is present in the regression at specific times. When MI is calculated for corporate bond funds corporate credit index is used as a proxy for investment grade bonds. For the remaining bond funds government credit index serves as a proxy for investment grade bonds.

5.2.2 Spearman rank correlation tests

Spearman rank correlation test is applied to examine whether the performance of bond and money market funds in the Finnish mutual fund market is persistent over time. It is important to determine if the performance relationship is consistent over time or, rather, is period specific. If the performance relationship is period specific, then prior period performance would provide inconsistent insight into the subsequent period performance and, therefore, would be of minimal value in the mutual fund selection process. A thorough analysis of the relationship between fund's prior and subsequent performance is conducted by assigning a rank for each of the funds based on each individual performance measure. The ranking procedure is repeated for every time period examined.

[13] Pairwise correlation of MSCI Euro Credit Government index and MSCI Euro Credit Corporate index monthly returns during the examination period was 0.80. All other pairwise correlations between the benchmark indexes did not raise concerns over multicollinearity.

Spearman rank correlation test is a non-parametric test of association which does not depend on the underlying empirical distribution of the performance measures used in ranking the funds. In addition, Spearman rank correlation coefficient is not severely influenced by extreme observations like some other measures e.g. contingency table χ^2 tests of independence. It provides insight into the strength and direction of the relationship between the prior and the subsequent period of performance. Spearman rank correlation coefficient (r) is defined as follows:

$$r_{t1,t2} = 1 - \frac{6\sum_{i=1}^{n} D^2_{t1,t2;j}}{n(n^2-1)} \qquad (5)$$

where

$r_{t1,\ t2}$ = Spearman rank correlation coefficient between time periods *t1* and *t2*

$D_{t1,t,2;\ j}$ = difference between fund *i*'s rank measured by performance measure *j* between time periods *t1* and *t2*

n = number of funds existing during both periods *t1* and *t2*

The data set is partitioned into one- and three-year sub periods. This division allows investigation of whether the possible performance persistence is only a local phenomenon between two consequent years or if it persists over longer term. Studying the rankings of funds between time periods of differing length gives additional information about the possible effects of the length of the observation period in predicting future performance. Sub periods form altogether 28 (24) overlapping time intervals for bond (money market) funds. Each time interval is further split into evaluation period and subsequent investment period made up of one sub period, respectively. Comparison of the results between the overlapping intervals provides insight into the stability of the performance relationship over time.

To apply Spearman rank correlation test the mutual funds are first ranked by their relative performance during the evaluation period and then ranked again based on the same criterion during the following investment period. A statistically significant positive Spearman rank correlation coefficient between prior and subsequent performance ranking would indicate the existence of performance persistence and, therefore, the rejection of *Hypothesis I.* As a consequence, investment strategy of investing into funds that had performed well in the past

would be recommendable. If the Spearman rank correlation coefficient would be negative, *Hypothesis I* will be rejected again and contrarian investment strategy supported. In case of statistically insignificant relationship between prior and subsequent period mutual fund rankings, the performance rankings will not give any additional insight into the prediction of future performance and are, therefore, invaluable in the fund selection process. In this case *Hypothesis I* is not rejected.

Comparison of the correlation coefficients between time intervals of differing length provides information to draw conclusions about *Hypothesis II*. If either one-year or three-year evaluation period is constantly better in explaining the performance of funds in the following investment period then the length of the evaluation period does matter in predicting fund performance and *Hypothesis II* is, consequently, rejected. However, if the sign of the correlation coefficient varies from one period to another for the superior predictor period *Hypothesis II* cannot be rejected. Knowledge that a certain observation period is the most accurate predictor of relative fund rankings is invaluable information to an investor, if the direction of the relationship between prior and future rankings is not known ex-ante.

5.2.3 Regression tests

The tests of relative performance persistence of fixed income funds are complemented by testing the persistence of absolute performance. Regression analysis is employed similarly to the methods of e.g. Hallahan (1999) to investigate the persistence of fixed income funds' absolute performance. The analysis is not as thorough as the Spearman rank correlation tests, but provides still additional information on whether the hypotheses should be rejected or not.

For the purposes of the regression analysis the observation period is divided into one investment period (2003-2004) and five prior evaluation periods of differing length, all ending to year 2002. Of the calculated performance measures, total returns and Sharpe ratios (total returns and Alphas) of the bond funds (money market funds) are used in cross-sectional regressions of investment period's performance measures over prior evaluation period's performance measures. Employed regression model is of the following form:

$$\Omega_{i,\,2003\text{-}2004} = a + b\Omega_{ij} + \varepsilon_i \qquad (6)$$

where

Ω_{ij} = performance measure for fund i over period j

If the slope coefficient b in equation six is insignificantly different from zero then subsequent absolute performance is independent of prior performance and the results are not in favour of rejecting *Hypothesis I*. If b is statistically significantly different from zero then the results imply that absolute performance persistence exists and the rejection of *Hypothesis I* is encouraged.

Hypothesis II states that information content of prior period performance is independent of its' length. This hypothesis is examined by investigating the p-values of the slope coefficients and the explanatory powers (R^2) of the regressions. If the p-values and the explanatory powers of the different regressions do not differ from each other then *Hypothesis II* will not be rejected. If the values differ between regressions then possible patterns in p- and R^2 values are invesigated. An increasing or decreasing pattern in p- and R^2 values as the length of the prior performance period is increased would indicate that the length of the performance history does play a role in predicting future returns. Especially, if persistence in performance is detected, higher p- and R^2 values for longer evaluation periods would indicate longer term persistence in performance. Lack of patterns in the p- and R^2 values of the different performance history periods indicates that *Hypothesis II* should not be rejected.

5.2.4 Survivorship bias

The data set under examination is subject to survivorship bias in conducting the tests introduced in the previous sections. However, the effect of survivorship bias on the validity of the results is most likely very small or indistinguishable from zero. Previous research suggests that survivorship bias has less impact on bond funds compared to stock funds (Blake et al. 1993, Dahlqvist et al. 2000 and Ayadi and Kryzanowski 2004). According to Blake et al. this may be due to the stability in the performance of bond funds. Goetzmann and Ibbotson (1994) note that survivorship bias is partially mitigated if the comparison is of survivor's relative performance against other survivors, rather than comparison of each surviving fund against some absolute market index. The Spearman rank correlation tests of this study examine the relative performance of survivor funds against other survivor funds.

Survivorship bias refers to the notion that mutual funds, which do not survive are, in general, those funds that have performed poorly. This will inflate the average performance of the remaining funds and possibly create performance persistence among them. The most likely funds not to survive are those that have performed poorly and failed to improve. The exclusion of funds that have ceased to exist due to constant poor performance does not create performance persistence within a biased data set. Performance persistence is created if the data set excludes funds that have not survived due to exceptionally bad performance that was preceded by good performance. Data sets consisting of bond and money market funds are less likely to be affected by this kind of survivorship bias than equity fund data sets due to the stability in bond and money market fund performance. Moreover, Carhart, Carpenter, Lynch and Musto (2002) find that non-survivors in the U.S mutual fund industry disappear primarily because of multi-year underperformance, rather than a single poor annual return. This study examines the performance persistence phenomenon between time periods of differing length. Therefore, especially the shortest examination periods of this study should be almost totally free from survivorship bias, if Carhart et al. results hold true also for Finnish mutual fund industry.

Brown, Ibbotson and Ross (1992) present a view on survivorship bias, which is elaborated by Hendricks, Patel and Zeckhauser (1993) and Malkiel (1995). According to their view mutual fund survivorship is inversely related to total return volatility. Under this assumption high-risk funds, which have survived represent a successful high-risk strategy and high-risk funds that have not been successful, no longer exist. In this situation the remaining mutual funds would be biased towards persistence in performance. An attempt to control over this kind of survivorship bias is made, similarly to Sauer (1997), by dividing the mutual funds into high-risk and low-risk groups by their average monthly standard deviations and repeating the Spearman rank correlation tests for these sub groups. High-risk group consists of the top 40 % and low-risk group of the bottom 40% funds ranked based on their average monthly standard deviations during the evaluation period. The division will concentrate the potential impact of the type of survivorship bias discussed above in the high-risk group. Consistency in the results between the groups would indicate that the performance relationship is not entirely driven by this type of survivorship bias.

5.3 EMPIRICAL RESULTS

5.3.1 Summary statistics

Table 2 presents summary statistics for bond and money market funds' mean performance during the different investigation periods of this study. The second column of the table shows that the number of bond funds having at least one year of return data has increased sixth-fold between years 1995 and 2004. 77 of the 93 funds in 2004 have return data also for the two preceding years. The number of money market funds has experienced similar growth to bond funds. It increased five-fold during the period 1996-2004. There are less bond and money market funds in 2004 than in 2003. This is the only decrease in the amount of funds between two consecutive years during the study period. The decrease is attributable to internal mergers within three Finnish fund companies and exclusion of four foreign registered bond funds from the Mutual Fund Reports.

Average returns for bond funds across all performance measures were at their highest in the beginning of the investigation period 1995-2004. Returns plummeted in 1999 reaching negative levels. During the years 2000 and 2001, the performance of bond funds recovered before weakening again in 2002. The bond fund returns remained at stable levels between 2002 and 2004. Money market fund returns experienced similar patterns to bond funds during the investigation period. Comparison between the changes in the European Central Bank's (ECB) reference interest rate, displayed in table 3, and the return rate of fixed income funds reveals similarities between the two rates. The yield on bond and money market funds follows the trend of the ECB rate. The return on an average fixed income fund in Finland seems to be largely depended on the general interest rate level within the Euro zone. Also, after the establishment of the ECB interest rate regime in 1999, the returns for Finnish fixed income funds have become more volatile. The trend is stronger for money market funds, although also observable for bond funds. Whether the stronger volatility is a result of Finland joining the interest regime or a consequence of the increased number of funds in the market is unclear. However, most likely the effect of new funds entering the Finnish market has contributed the most to the volatility increase.

Table 2

Summary statistics of fixed income fund monthly mean performance

(standard deviations in parenthesis)

		Bond funds					Money market funds		
Period	*n*	Total returns	RMAD	Sharpe ratio	Jensen Alpha	Multi-index	*n*	Total returns	Alpha
1995	15	1.31 %	6.53 %	0.57	0.18 %	0.28 %	n/a	n/a	n/a
		(0.26 %)	(2.89 %)	(0.16)	(0.22 %)	(0.30 %)	n/a	n/a	n/a
1996	18	0.81 %	2.56 %	0.26	0.26 %	0.13 %	7	0.32 %	0.00 %
		(0.20 %)	(0.22 %)	(0.17)	(0.20 %)	(0.20 %)		(0,05 %)	(0.08 %)
1997	20	0.72 %	2.36 %	0.21	0.23 %	0.15 %	13	0.25 %	-0.02 %
		(0.28 %)	(2.50 %)	(0.14)	(0.29 %)	(0.26 %)		(0.02 %)	(0.04 %)
1998	25	0.77 %	4.30 %	0.55	0.13 %	0.12 %	15	0.29 %	0.00 %
		(0.24 %)	2.63 %	(0.34)	(0.20 %)	(0.20 %)		(0.02 %)	(0.03 %)
1999	30	-0.05 %	-5.43 %	-0.49	-0.25 %	-0.28 %	17	0.20 %	-0.03 %
		(0.36 %)	(3.83 %)	(0.31)	(0.30 %)	(0.25 %)		(0.01%)	(0.03 %)
2000	46	0.54 %	0.70 %	0.08	0.11 %	0.08 %	21	0.33 %	-0.16 %
		(0.20 %)	(1,64 %)	0.10	(0.19 %)	(0.17 %)		(0.12 %)	(0.48 %)
2001	56	0.51 %	1.05 %	0.09	0.01 %	0.04 %	23	0.40 %	-0.08 %
		(0.62 %)	(5.08 %)	(0.31)	(0.64 %)	(0.63 %)		(0.23 %)	(0.32 %)
2002	85	0.17 %	-1.25 %	-0.02	-0.30 %	-0.30 %	32	0.05 %	-0.25 %
		(0.69 %)	(5.58 %)	(0.37)	(0.64 %)	(0.65 %)		(0.49 %)	(0.73 %)
2003	98	0.11 %	-1.92 %	-0.03	-0.27 %	-0.27 %	35	0.00 %	-0.20 %
		(0.76 %)	(6.67 %)	(0.44)	(0.74 %)	(0.72 %)		(0.53 %)	(0.65 %)
2004	93	0.21 %	-0.25 %	0.09	-0.20 %	-0.21 %	34	0.03 %	-0.16 %
		(0.58 %)	(5.21 %)	(0.38)	(0.52 %)	(0.53 %)		(0.35 %)	(0.49 %)
1995-1997	15	0.97 %	4.05 %	0.36	0.24 %	0.19 %	n/a	n/a	n/a
		(0.09 %)	(0.93 %)	(0.07)	(0.08 %)	(0.08 %)	n/a	n/a	n/a
1996-1998	17	0.80 %	3.39 %	0.39	0.23 %	0.16 %	6	0.29 %	-0.01 %
		(0.13 %)	(1.37 %)	(0.13)	(0.13 %)	(0.13 %)		(0.01 %)	(0.03 %)
1997-1999	18	0.45 %	0.19 %	0.09	0.01 %	-0.02 %	12	0.25 %	-0.02 %
		(0.12 %)	(1.06 %)	(0.13)	(0.12 %)	(0.10 %)		(0.01 %)	(0.03 %)
1998-2000	23	0.42 %	-0.03 %	0.04	0.00 %	-0.02 %	14	0.27 %	-0.03 %
		(0.12 %)	(1.15 %)	(0.12)	(0.11 %)	(0.10 %)		(0.01 %)	(0.03 %)
1999-2001	27	0.36 %	-1.03 %	-0.10	-0.01 %	-0.03 %	16	0.29 %	-0.03 %
		(0.25 %)	(2.12 %)	(0.13)	(0.24 %)	(0.21 %)		(0.02 %)	0.03 %)
2000-2002	41	0.51 %	0.85 %	0.10	0.03 %	0.04 %	19	0.29 %	-0.16 %
		(0.17 %)	(1.64 %)	(0.12)	(0.16 %)	(0.17 %)		(0.03 %)	(0.58 %)
2001-2003	48	0.34 %	-0.36 %	0.02	-0.13 %	-0.09 %	22	0.22 %	-0.15 %
		(0.27 %)	(2.85 %)	(0.17)	(0.26 %)	(0.24 %)		(0.16 %)	(0.60 %)
2002-2004	77	0.17 %	-1.24 %	0.01	-0.25 %	-0.25 %	25	0.13 %	-0.15 %
		(0.59 %)	(4.96 %)	(0.32)	(0.53 %)	(0.55 %)		(0.31 %)	(0.63 %)

Table 3

European Central Bank's reference interest rate 1999-2004

Year	Month	Rate
2004	December	2.00
2003	June	2.00
	March	2.50
2002	December	2.75
2001	November	3.25
	September	3.75
	August	4.25
	May	4.50
2000	October	4.75
	September	4.50
	June	4.25
	April	3.75
	March	3.50
	February	3.25
1999	November	3.00
	April	2.50
	January	3.00

Source: European Central Bank

5.3.2 Spearman rank correlation tests

Bond funds

Table 4 reports the empirical results of the Spearman rank correlation tests for Finnish bond funds for every pair of evaluation and investment period examined. The rankings are based on five different performance measures calculated from funds average monthly returns during each period. Altogether nine pairs of one-year evaluation and investment period, seven pairs of one-year evaluation and three-year investment period, seven pairs of three-year evaluation and one-year investment period and five pairs of three-year evaluation and investment period are examined. The tests are run separately for five different performance measures for all the 28 time intervals investigated. Altogether 140 Spearman rank correlation coefficients are calculated for bond funds. A statistically significant positive correlation coefficient provides evidence of performance persistence, whereas a statistically negative correlation coefficient is a sign of performance inversion between the examined time periods.

In general, Finnish bond funds seem to have stronger tendency towards performance persistence than performance inversion. 23 of the 140 correlation coefficients are positive at 10 % statistical significance level and 16 negative. 21 out of the 23 positive coefficients are

observed during the four most recent years (2000-2004) included in the study. The remaining positive coefficients are found when fund rankings between the years 1997-1999 and the year 2000 are compared. The distribution of negative coefficients is more even. A slight concentration of negative coefficients is observable between years around the turn of the century. Positive coefficients are found across all performance measures, whereas negative coefficients are concentrated to Sharpe ratio, Jensen alpha and multi-index performance measures.

Within the sample of one-year evaluation and investment period the performance of bond funds exhibits strong persistence between the years 2002-2003 and 2003-2004. Coefficient values during the periods are statistically significant at 1 % level across all performance measures. It appears that when strong performance persistence is detected between two consecutive years the persistence is very robust to the performance measure selection. Raw returns, risk adjusted returns and factor models produce similar results. There are no large variations between the correlation coefficient values for different performance measures. On average 44 % of the variation in the performance rankings of 2003 can be explained by the rankings of 2002. Between the years 2003-2004 the explanation ratio almost doubles to 83 %, an extremely high ratio. During the whole examination period of the study, negative correlation coefficients are observed only for Jensen alpha and multi-index performance measures within the sample of one-year evaluation and investment period. The significance of negative coefficients is weaker than positive coefficients' significance.

The results for the performance persistence of bond funds between two consecutive years are clear. No persistence or inversion in performance is detectable that would last throughout the investigation period of the study. However, the results indicate that year to year bond fund performance has been very persistent during the years 2002-2004. Provided that the persistence is not dominated by underperforming funds, an investor would have received above average returns over the next two years in 2002 by choosing to allocate his or her bond fund investments into the best performing funds. Another important result from an investors' point of view is that irrespective of the performance measure selected to rank the funds, the best performing funds would have continued their superior performance. Examination of funds' relative average performance would not have given any valuable insight into investors' fund selection process during other examination periods.

Table 4

Spearman rank correlation coefficients for bond funds for every pair of successive sub periods examined. Two first columns display the 28 different combinations of evaluation and investment periods. Third column shows the number of funds existing during the evaluation and investment period. The rest of the columns display the correlation coefficients for each performance measure and the corresponding *p*-values. Statistically significant correlation coefficients are bolded. The last two lines provide summary data on the statistically significant coefficients found.

Evaluation period	Investment period	*n*	Total returns	*p-value*	RMAD	*p-value*	Sharpe ratio	*p-value*	Jensen Alpha	*p-value*	Multi-index	*p-value*
1995	1996	15	0.0179	(0.948)	0.0286	(0.916)	0.1179	(0.666)	-0.1964	(0.475)	-0.3857	(0.171)
1996	1997	17	-0.0466	(0.855)	0.1078	(0.672)	0.1814	(0.479)	-0.0931	(0.714)	-0.1299	(0.611)
1997	1998	19	0.1211	(0.614)	0.1579	(0.511)	0.3789	(0.125)	**-0.6386****	(0.014)	0.0474	(0.843)
1998	1999	25	-0.3192	(0.131)	-0.3115	(0.140)	-0.1585	(0.445)	-0.2808	(0.182)	-0.3015	(0.153)
1999	2000	29	0.1212	(0.527)	0.0946	(0.621)	-0.0532	(0.780)	0.1108	(0.562)	-0.1360	(0.479)
2000	2001	36	0.2242	(0.193)	0.1961	(0.254)	**0.3156***	(0.070)	0.0741	(0.663)	0.2396	(0.165)
2001	2002	51	-0.1320	(0.355)	-0.1399	(0.327)	0.1845	(0.198)	**-0.3091****	(0.033)	**-0.2519***	(0.081)
2002	2003	81	**0.4133*****	(0.000)	**0.4487*****	(0.000)	**0.5355*****	(0.000)	**0.3819*****	(0.000)	**0.3999*****	(0.000)
2003	2004	93	**0.8488*****	(0.000)	**0.8068*****	(0.000)	**0.8634*****	(0.000)	**0.8439*****	(0.000)	**0.8006*****	(0.000)
1995	1996-1998	15	-0.1893	(0.490)	-0.2857	(0.303)	0.3143	(0.259)	**-0.5429***	(0.061)	-0.2179	(0.429)
1996	1997-1999	16	0.0971	(0.712)	0.1147	(0.663)	-0.0088	(0.973)	0.1559	(0.555)	0.1471	(0.577)
1997	1998-2000	17	0.0539	(0.832)	0.0270	(0.916)	-0.1618	(0.527)	0.1225	(0.630)	-0.0196	(0.939)
1998	1999-2001	22	-0.2219	(0.321)	-0.2468	(0.271)	-0.3631	(0.111)	0.0446	(0.840)	0.0548	(0.804)
1999	2000-2002	27	-0.3327	(0.102)	-0.3199	(0.115)	**-0.4792****	(0.022)	**-0.3364***	(0.098)	-0.2515	(0.211)
2000	2001-2003	37	0.1248	(0.459)	0.1906	(0.260)	0.2553	(0.134)	0.1842	(0.276)	0.2117	(0.212)
2001	2002-2004	44	-0.1676	(0.278)	-0.1460	(0.344)	0.1123	(0.465)	**-0.2634***	(0.091)	**-0.3360****	(0.033)
1995-1997	1998	15	-0.2750	(0.321)	-0.1018	(0.709)	0.1446	(0.597)	**-0.5536***	(0.057)	-0.2929	(0.292)
1996-1998	1999	16	-0.1912	(0.470)	-0.2235	(0.400)	**-0.5765****	(0.041)	-0.0294	(0.910)	-0.0882	(0.737)
1997-1999	2000	16	**0.4765***	(0.085)	0.4412	(0.108)	0.3765	(0.165)	**0.5500***	(0.050)	0.2676	(0.316)
1998-2000	2001	17	**-0.5711****	(0.036)	0.2547	(0.256)	-0.0582	(0.792)	0.0819	(0.711)	0.0807	(0.715)
1999-2001	2002	25	**-0.4231****	(0.049)	-0.0538	(0.794)	-0.2508	(0.231)	-0.2885	(0.170)	**-0.3638***	(0.087)
2000-2002	2003	37	**0.6163*****	(0.000)	**0.5976*****	(0.001)	**0.5261*****	(0.003)	**0.5880*****	(0.001)	**0.5433*****	(0.002)
2001-2003	2004	44	**0.5774*****	(0.001)	**0.6519*****	(0.000)	**0.7288*****	(0.000)	**0.6080*****	(0.000)	**0.4278*****	(0.008)
1995-1997	1998-2000	13	0.2582	(0.389)	0.0714	(0.810)	0.0769	(0.794)	0.2582	(0.389)	0.1978	(0.506)
1996-1998	1999-2001	15	0.2607	(0.346)	0.2464	(0.372)	-0.0482	(0.859)	0.2107	(0.443)	0.2464	(0.372)
1997-1999	2000-2002	15	-0.1893	(0.490)	-0.1464	(0.592)	**-0.6696****	(0.025)	-0.1714	(0.531)	-0.2643	(0.340)
1998-2000	2001-2003	19	-0.3193	(0.192)	-0.3211	(0.190)	**-2.925*****	(0.000)	-0.2930	(0.229)	-0.2175	(0.368)
1999-2001	2002-2004	22	**-0.4071****	(0.076)	-0.0096	(0.965)	-0.3461	(0.127)	-0.1530	(0.490)	-0.2434	(0.277)

Statistically significant positive coefficients at 10 % signicance level: 23

Statistically significant negative coefficients at 10 % signicance level: 16

*Significant at 10 % level

**Significant at 5 % level

***Significant at 1 % level

One-year evaluation period does poor job in predicting Finnish bond fund rankings for the following three years. The second section of table 4 shows that only 5 of the 35 correlation coefficients are statistically significant. Moreover, the statistically significant correlation coefficients occur at different times and are concentrated to Jensen alpha performance measure. The results give, however, some insight into the fund selection process. Bond fund rankings show weak evidence of performance inversion during periods 1999-2002 and 2001-2004. During the former period, five out of five correlation coefficients had negative values and during the latter period four out of five coefficients were negative. Both periods had two significantly negative coefficients. 1999 was a year of a strong growth in the financial markets, whereas in 2001 a downturn following the burst of the internet bubble started. It seems that after an exceptionally strong/weak year of financial market performance, the relative performance of bond funds has a tendency to invert within the next three years. The statistical significance of the results across performance measures is, however, weak. Therefore, a contrarian investment strategy cannot be recommended for a long-term investor seeking to invest into bond funds after a year of exceptional financial market performance.

Empirical evidence from employing three-year evaluation period to predict the fund rankings for the forthcoming year is, to a large extent, similar to the evidence for one-year evaluation period. The results indicate strong persistence in bond fund performance after year 2000. *P*-values of correlation coefficients for periods 2000-2003 and 2001-2004 are statistically significant at 1 % level for every performance measure. During these periods, evaluation period rankings can explain, on average, 58 % of the variation in investment period rankings. No long-term patterns are observed in the performance relationship, which would suggest that bond fund performance persists or inverts over time. A slight reversion in fund rankings is observable during period 1999-2002. All coefficients for the period are negative, two of them with statistical significance. Again, the rankings of a period dominated by exceptional financial market performance are reversed for the following period.

Results obtained for the six-year time intervals are almost entirely insignificant. Therefore, no strong conclusions can be drawn about the performance relationship over time. Only three coefficients have statistically significant values. One factor, which contributes to the insignificance of the results for six-year time intervals, is the considerably smaller amount of observations compared with the other time intervals. However, as will be later seen in this thesis, even a smaller amount of observations is enough to produce very strong results, if a

genuine performance relationship exists over time. Excluding the statistical significance of the results from consideration, bond fund performance seems to invert within the six-year time intervals. Every time period after the year 1996 has negative correlation coefficients across all performance measures.

The evidence obtained from the results for Finnish bond funds is mixed with respect to *Hypothesis I.* The results for the period 1995-1999 do not lend support for rejecting *Hypothesis I.* However, the evidence is less clear between years 2000-2004. Especially the period 2002-2004 suggests strong persistence in bond fund performance. Reported evidence implies that as the Finnish bond fund market has matured the more persistent has been the performance of the funds on the market. It is unclear, whether the detected persistence during the later years of the study is a result caused by the larger sample size, as suggested by Blake et al. (1993), or other factors like the introduction of ECB's reference interest rate.

The findings for the whole sample period are consistent with Blake et al. (1993) who found, also using Spearman rank correlation test, no clear evidence for or against performance persistence in U.S bond funds. Maag and Zimmerman (2000) report similar results for German bond funds using the same methodology and Dahlqvist et al. (2000) using different methodology for Swedish bond funds. The results for the period 2002-2004 are consistent with those of Silva et al. (2005) for European bond funds. They found evidence suggesting consistency in European bond fund performance, particularly in the case of Spanish, French and German funds. Empirical evidence presented in this section for the time interval 1995-1998 disagrees with the findings of Sandvall (1999) for the same period. Sandvall reports evidence of performance persistence in Finnish bond fund performance for the period.

A comparison of the results across time intervals of differing length shows that longer term performance of bond funds is in general harder to predict than short-term performance. Vast majority of the significant correlation coefficients occur for one-year investment periods. *Hypothesis II* states that "Information content of prior period performance is invariant to the length of the observation period of prior performance". Both one- and three-year evaluation periods were found to be good predictors of performance for the years 2003 and 2004. One- and three-year evaluation periods were able to explain 44 % and 57 %, respectively, of the variation in fund rankings in 2003. In 2004 the respective figures were 83 % and 59 % for one- and three-year evaluation periods. The numbers indicate that there is less variability in

longer time period's ability to forecast future fund rankings, whereas a shorter time period may be far superior predictor on certain years. The results do not provide evidence in favour of rejecting *Hypothesis II.*

Carhart, Carpenter, Lynch and Musto (2002) have found that non-survivors in the U.S mutual fund industry disappear primarily because of multi-year underperformance, rather than a single poor annual return. If this result holds true for the Finnish mutual fund market, longer time intervals of this study are expected to be most severely affected by survivorship bias. Within a longer time interval a good performance by a fund in the beginning of the period can turn into multi-period underperformance and lead to the extinction of the fund before the end of the time interval. Since the fund did not survive until the end of the time interval, it would be excluded from the study for that period. The exclusion creates survivorship bias into the sample and has the effect of elevating the performance persistence among sample funds. Performance persistence within the six-year time intervals would raise concerns over the effect of survivorship bias on the validity of the results. No performance persistence was detected within the six-year time intervals. Therefore, the evidence presented in this section shows that the validity of the results is not severely influenced by survivorship bias, provided that bond funds in the Finnish market cease to exist primarily due to multi-year underperformance.

Money market funds

Table 5 displays the findings from Spearman rank correlation tests for Finnish money market funds. Similarly to bond funds different combinations of evaluation and investment periods are considered. The total of 24 time intervals consists of eight pairs of one-year examination and investment period, six pairs of one-year examination and three-year investment period, six pairs of three-year examination and one-year investment period and four pairs of three-year examination and investment period. Results are reported for two performance measures, total return and Alpha, over each time interval. A total of 48 correlation coefficients is calculated.

Overall, the empirical evidence presented in table 5 suggests strong consistency in the performance of Finnish money market funds. 33 of the 48 correlation coefficients are statistically significant. All significant coefficients indicate a positive relationship between

prior and subsequent period fund rankings. Moreover, most of the coefficients are significant even at 1 % level, which is clear evidence of the strength of the performance relationship. Statistically significant results are not found for time periods including year 1996 (except for one) for a simple reason: the fund sample that had return data from the beginning of 1996

Table 5

Spearman rank correlation coefficients for money market funds for every pair of successive sub periods examined. Two first columns display the 24 different combinations of evaluation and investment periods. Third column shows the number of funds existing during the evaluation and investment period. The rest of the columns display the correlation coefficients for each performance measure and the corresponding *p*-values. Statistically significant correlation coefficients are bolded. The lines below the table provide summary data on the statistically significant coefficients found.

Evaluation period	Investment period	*n*	Total returns	*p-value*	Alpha	*p-value*
1996	1997	6	0.6000	(0.237)	0.6571	(0.202)
1997	1998	13	**0.6813****	(0.036)	**0.9011*****	(0.009)
1998	1999	14	**0.8066****	(0.012)	**0.8681*****	(0.008)
1999	2000	17	0.2770	(0.284)	**0.8725*****	(0.003)
2000	2001	21	**0.6792*****	(0.007)	**0.9455*****	(0.000)
2001	2002	22	**0.5246****	(0.026)	**0.8103*****	(0.001)
2002	2003	31	**0.6694*****	(0.001)	**0.6310*****	(0.002)
2003	2004	34	**0.6489*****	(0.001)	0.2281	(0.199)
1996	1997-1999	6	0.2571	(0.590)	0.3714	(0.444)
1997	1998-2000	11	0.5727	(0.100)	**0.9182****	(0.016)
1998	1999-2001	13	**0.5769***	(0.069)	**0.8571****	(0.012)
1999	2000-2002	16	**0.7294****	(0.013)	**0.9118*****	(0.003)
2000	2001-2003	21	0.0571	(0.801)	**0.6065****	(0.013)
2001	2002-2004	21	**0.5766****	(0.018)	**0.8649*****	(0.001)
1996-1998	1999	6	-0.8286	(0.123)	0.4857	(0.327)
1997-1999	2000	12	**0.5804***	(0.081)	**0.8112****	(0.021)
1998-2000	2001	13	0.2308	(0.431)	0.4286	(0.163)
1999-2001	2002	16	-0.0676	(0.797)	**0.5353***	(0.056)
2000-2002	2003	18	**0.7668*****	(0.006)	**0.9794*****	(0.001)
2001-2003	2004	21	0.2299	(0.316)	**0.5078****	(0.034)
1996-1998	1999-2001	6	0.4286	(0.382)	**1.000*****	(0.004)
1997-1999	2000-2002	11	**0.6364***	(0.072)	**0.8455****	(0.023)
1998-2000	2001-2003	13	**0.6868****	(0.035)	**0.9066*****	(0.009)
1999-2001	2002-2004	15	**0.7250****	(0.017)	**0.9607*****	(0.003)

Statistically significant positive coefficients at 10 % signicance level: 33

Statistically significant negative coefficients at 10 % signicance level: 0

*Significant at 10 % level

**Significant at 5 % level

***Significant at 1 % level

included only six funds. When Spearman rank correlation test is applied to a sample this small, even a change of one rank between two funds is enough to make the correlation coefficient insignificant at 5 % level. Due to the small number of funds year 1995 was left without consideration.

Money market funds seem to exhibit persistence in performance over time. Statistically significant correlation coefficients are observed from time period to another. The phenomenon is strongest when performance is measured by Alpha. 19 of the 24 Alpha coefficients have statistical significance. The result is consistent with Hallahan's (1999) findings for Australian fixed interest funds. He finds evidence of performance persistence in his sample, particularly when the performance is measured by Jensen alpha. Alpha measure used in this thesis is very similar to Jensen alpha.

Concise evidence of performance persistence and its' perseverance over time is found by examining the fund rankings between two consecutive years. First section of table 5 presents the evidence. 12 out of 16 correlation coefficients are significantly positive. During the entire investigation period, prior year's fund rankings can explain, on average, 68 % of the variation in the following year's rankings. The implications for money market mutual fund selection process are clear. Provided that the persistence is not entirely concentrated to the worst performing funds, which seems unlikely due to the strength of the results, a fund that performed well over the preceding period is likely to perform well over the following year and even the years to come. Therefore, an investor would be likely to do well by investing his or her money market investments into the best performing funds of the year preceding the investment.

The persistence in money market performance is very strong. Examination of the validity of the one-year money market rankings as predictors of longer term (three-year) performance provides additional proof of strong performance consistency. The results are, to a large extent, coherent over time, especially for Alpha performance measure. Alpha does better job in predicting the rankings of the investment period during every time interval. 8 out of 12 coefficients have statistical significance. As a general rule, it is not recommendable for an investor to draw conclusions about a fund's attractiveness based on its historical performance. Findings reported in table 5, however, indicate that even a shorter time period serves as a good predictor of money market funds' relative performance.

The least evidence in favour of consistent performance is found when three-year evaluation period is used to forecast the rankings of one-year investment period. Only two out of six total return coefficients have statistically significant values. In addition, the only negative correlation coefficient values, although statistically insignificant, are found among this sub set of coefficients. The results for Alpha are inline with the findings reported for other time intervals.

The clearest evidence in favour of persistence in money market performance over time is obtained by examining the empirical evidence for six-year time interval. Statistically significant values are detected for all but one correlation coefficient. The findings indicate very high explanation power for three-year evaluation period in explaining the fund rankings during the subsequent three-year period. Again, fund rankings are more stable, if they are based on Alphas. The Alpha rankings for the six money market funds existing in the beginning of 1996 do not even change between the evaluation period (1996-1998) and investment period (1999-2001).

Empirical evidence from the Spearman rank correlation tests suggests strong performance persistence in money market funds relative performance. Therefore, *Hypothesis I* is rejected for money market funds. The findings are consistent with the results reported by Domian and Reichenstein (1998) for U.S data and with Dahlqvist et al. (2000) for Swedish data. Another main finding of this section is that performance rankings of Finnish money market funds are more consistent, if abnormal return over three-month Euribor/Helibor (Alpha) is used to rank the funds instead of total return.

The reported evidence does not lend support to rejecting the *Hypothesis II* for money market funds. Although shorter observation period seems to be more concise in predicting subsequent year's rankings, the evidence is clearly not convincing enough to reject *Hypothesis II.* In addition, the findings for three-year investment periods do not give reason to conclude that either shorter or longer evaluation period would be superior predictor of future fund rankings. The results suggest that short- and long-term relative performance of Finnish money market funds is equally predictable. There are no major differences between the coefficient values and their significance across investment periods.

Since strong performance persistence is found within the six-year time interval, the results could suffer from survivorship bias stemming from multi-period underperformance and subsequent closure/acquisition of some funds. However, the investigation of performance persistence in this thesis is not limited to six-year time intervals. Especially the two-year time intervals should be virtually free from the kind of survivorship bias referred to above. Consistency in the findings across time intervals indicates that survivorship bias in the data set does not affect the reliability of the results.

High- and low-risk groups

Table 6 presents the results of Spearman rank correlation coefficient tests for the bond and money market fund sub groups. The funds are partitioned to high- and low-risk groups by their total return volatilities during the evaluation period. Fund rankings are based on average monthly total returns of the periods. Division of funds into sub groups decreases the number of observations per time interval. Hence, the statistical significance of the results for earlier and especially longer time intervals is considerably weakened. Due to the relatively small number of money market funds in the Finnish mutual fund market during 1990's, many time intervals used for the full sample had to be excluded from the analysis.

According to Brown et al. (1992) survivorship bias is inversely related to total return volatility. Under this interpretation, survivorship bias is driven by volatile funds. Successful high-risk funds perform persistently and the unsuccessful funds disappear from the market. If this kind of survivorship bias would distort the results obtained for the full sample, performance persistence within the high-risk group should drive the full sample findings. The general observation from table 6 is that performance persistence occurs within both sub groups during the same years it is observed for the full sample.

Money market funds are the least volatile fund group in the mutual fund market. Therefore, the differences in average volatilities between the two subgroups are not large. Findings for money market funds are consistent across the sub samples. Five and four statistically significant positive correlation coefficients are found for the low- and high volatility groups, respectively. On three out of four possible occasions the coefficients of the sub groups have significant values for the same time interval. Similarly to the findings for the full sample, evidence of performance persistence is reported within both sub groups when one-year fund

rankings are used to predict subsequent year's rankings. No evidence of consistent performance is found for other time intervals. This result is attributable to the small number

Table 6

Spearman rank correlation coefficients for bond and money market fund sub groups partitioned by total return volatility.
Results displayed for every pair of successive sub periods examined. Two first columns present the 28 different combinations of evaluation and investment periods. Third column shows the number of funds existing during the evaluation and investment period. The rest of the columns display the rank correlation coefficients between funds belonging to the indicated group during the evaluation period. Rankings are based on funds' total return. The last two lines provide summary data on the statistically significant coefficients found.

			Bond funds					Money market funds			
Evaluation period	Investment period	*n*	Low-std	*p-value*	High-std	*p-value*	*n*	Low-std	*p-value*	High-std	*p-value*
1995	1996	6	-0.0857	(0.856)	-0.5429	(0.279)	n/a	n/a	n/a	n/a	n/a
1996	1997	7	0.2143	(0.619)	0.0357	(0.933)	n/a	n/a	n/a	n/a	n/a
1997	1998	8	-0.3333	(0.407)	0.2381	(0.549)	5	0.7000	(0.234)	0.5000	(0.374)
1998	1999	10	-0.3333	(0.343)	**-0.6848***	(0.070)	6	**0.9429***	(0.060)	**0.9429***	(0.060)
1999	2000	12	**-0.7203****	(0.034)	0.3846	(0.228)	8	0.5238	(0.208)	0.6310	(0.139)
2000	2001	14	0.0593	(0.834)	**0.5033***	(0.093)	8	0.4524	(0.270)	**0.8571***	(0.058)
2001	2002	20	0.1895	(0.419)	-0.2211	(0.347)	9	**0.9000****	(0.034)	0.1000	(0.785)
2002	2003	33	0.2303	(0.202)	**0.4824****	(0.012)	12	**0.6014***	(0.072)	**0.6713****	(0.048)
2003	2004	38	**0.6761*****	(0.000)	**0.8259*****	(0.000)	14	**0.8022****	(0.013)	**0.5385***	(0.074)
1995	1996-1998	6	0.0286	(0.951)	-0.4857	(0.327)	n/a	n/a	n/a	n/a	n/a
1996	1997-1999	7	0.1071	(0.802)	0.0714	(0.867)	n/a	n/a	n/a	n/a	n/a
1997	1998-2000	7	-0.7143	(0.131)	0.7143	(0.141)	n/a	n/a	n/a	n/a	n/a
1998	1999-2001	9	-0.4000	(0.291)	-0.4833	(0.209)	5	0.8000	(0.185)	0.6000	(0.296)
1999	2000-2002	11	**-0.8455****	(0.023)	-0.0091	(0.978)	6	0.1429	(0.760)	0.6571	(0.192)
2000	2001-2003	14	0.4681	(0.115)	0.0725	(0.798)	7	0.2381	(0.549)	0.1071	(0.802)
2001	2002-2004	17	0.1936	(0.450)	**-0.6397****	(0.021)	8	0.5238	(0.208)	0.1667	(0.673)
1995-1997	1998	6	0.1071	(0.802)	-0.1429	(0.762)	n/a	n/a	n/a	n/a	n/a
1996-1998	1999	7	**-0.8929***	(0.071)	-0.4857	(0.327)	n/a	n/a	n/a	n/a	n/a
1997-1999	2000	6	0.5000	(0.374)	**0.9429***	(0.089)	n/a	n/a	n/a	n/a	n/a
1998-2000	2001	9	0.4286	(0.294)	0.5667	(0.148)	n/a	n/a	n/a	n/a	n/a
1999-2001	2002	9	-0.4667	(0.195)	-0.1429	(0.717)	6	0.8286	(0.123)	0.6571	(0.202)
2000-2002	2003	16	**0.5794****	(0.040)	0.3536	(0.207)	7	0.6429	(0.166)	0.7143	(0.131)
2001-2003	2004	18	**0.8706*****	(0.004)	**0.4840***	(0.062)	8	**0.8333***	(0.063)	0.1190	(0.762)
1995-1997	1998-2000	5	-0.2000	(0.710)	0.6000	(0.237)	n/a	n/a	n/a	n/a	n/a
1996-1998	1999-2001	7	0.3571	(0.415)	0.1000	(0.851)	n/a	n/a	n/a	n/a	n/a
1997-1999	2000-2002	5	0.2000	(0.710)	0.8000	(0.185)	n/a	n/a	n/a	n/a	n/a
1998-2000	2001-2003	8	0.1429	(0.762)	-0.2857	(0.474)	n/a	n/a	n/a	n/a	n/a
1999-2001	2002-2004	8	-0.3333	(0.407)	-0.7143	(0.131)	6	0.4286	(0.382)	0.7143	(0.171)
Statistically significant positive coefficients			3		5			5		4	
Statistically significant negative coefficients			3		2			0		0	

*Significant at 10 % level

**Significant at 5 % level

***Significant at 1 % level

of observations in each interval, which leads to insignificant results even if the fund rankings experience minor changes from period to another[14]. The distribution of significant and insignificant results is coherent throughout both subgroups, which alleviates concerns over the effect of survivorship bias on the results of the full sample.

Empirical evidence for bond funds indicates that the results for the high- and low-risk groups are not very consistent throughout the investigation period of the study. Statistically significant correlation coefficients of similar sign are observed simultaneously for both groups only twice. The result is not surprising. Findings from the full sample indicated performance persistence only between investment periods 2003 and 2004 and their respective evaluation periods. In the partitioned sample, consistency in performance is detected between investment period 2004 and its' two evaluation periods (2003 and 2001-2003). Thus, the performance persistence between these periods is not entirely driven by the impact of survivorship bias. The results for the investment period 2003 are inconsistent over sub groups and merit closer investigation. By using one-year evaluation period to explain the fund rankings within sub groups, the hypothesis of performance persistence is accepted for the high-risk group and rejected for the low-risk group. This finding coincides with Brown et al. (1992) view of survivorship bias. Consistent observations of stronger performance persistence within high-risk group would indicate that the full sample findings are driven by survivorship bias. The results support, however, opposite conclusion. The fund rankings of low-risk group are more persistent between evaluation period 2000-2002 and investment period 2003.

Altogether, the sub group findings for bond funds rule out survivorship bias as the main explanation for the full sample results in three out of four cases discussed in the previous paragraph. No evidence is found, which would indicate that the results presented in this thesis are heavily disturbed by survivorship bias.

5.3.3 Regression tests

Bond funds

[14] In a sample of eight funds five (three) ranking point changes between two periods are enough to make the results insignificant at 10 % (5 %) level.

The results from regressing the average monthly performance of Finnish bond funds between the years 2003 and 2004 (investment period) over five prior periods are summarized in table 7. The monthly performance of funds is measured by total return in Panel A and by Sharpe ratio in Panel B of the table 7. A positive (negative) slope coefficient implies persistence (reversal) in absolute bond fund performance during the investigation period. Strong patterns in slope coefficient *p*-value or explanatory power (R^2) of the regression as the length of prior period is increased would indicate that the length of prior period affects its predictive power.

Empirical evidence from the regression analysis is, partly, similar to the results obtained from Spearman rank correlation tests for bond funds. No clear evidence in favour of persistence or reversal in absolute bond fund performance is found. Two regressions out of ten report a statistically significant positive relationship between past returns and investment period returns. The amount of statistically significant negative coefficients is also two. The negative coefficients are produced by total return regressions and the positive coefficients by Sharpe ratio regressions.

Sharpe ratio regressions in Panel B support the results of Spearman rank correlation tests. Findings suggest persistence in bond fund absolute performance during the period 2000-2004. Average monthly performance of funds on periods starting after the year 2000 predicts poorly the average fund returns of the investment period. Explanatory powers of the regressions remain small and the slope coefficients do not obtain values statistically different from zero. Reverse is true for the regression results displayed in Panel A of table 7. Longer periods of total return history are superior over shorter periods in explaining investment period returns. The results reveal negative correlation between the average total returns of prior periods extending to 1990's and the average total returns of the investment period. Spearman rank correlation tests showed the tendency of the late 1990's bond fund performance to reverse itself after the turn of the century. Contrary to findings from Spearman rank correlation tests, no relationship between the average total returns during the years 2000-2002 and 2003-2004 is discovered. This suggests that the total returns of funds experienced considerable variability during the discussed years, but the relative performance of funds remained consistent.

The results imply that risk-adjusted performance is more stable over time than raw returns. The finding is not surprising. Risk adjusted measures e.g. Sharpe ratio express financial asset's excess return over specified benchmark rate taking into account the variability in the

asset's performance. Empirical evidence for Sharpe ratio suggests rejection of *Hypothesis I* for the period 2000-2004.

Table 7

Regression tests of performance persistence for bond mutual funds

The regression equation is $\Omega_{i,\,2003\text{-}2004} = a + b\Omega_{ij} + \varepsilon_i$, where $\Omega_{i,j}$ is the performance measure in question for fund i during period j.

Panel A: Regression of total return for period 2003-2004 over prior period total return
Number of funds depicts the funds existing during period 2003-2004 and the indicated prior period.

Prior period	Number of Funds	Slope Coefficient (b)	*p-value*	R^2
2001-2002	44	-0.0493	0.798	0.002
2000-2002	34	-0.1726	0.709	0.004
1999-2002	21	-1.1248**	0.017	0.267
1998-2002	18	-1.1370	0.103	0.157
1997-2002	15	-2.2947**	0.018	0.361

Panel B: Regression of Sharpe ratio for period 2003-2004 over prior period Sharpe ratio

Prior period	Number of Funds	Slope Coefficient (b)	*p-value*	R^2
2001-2002	44	0.3427*	0.074	0.074
2000-2002	34	1.013***	0.005	0.223
1999-2002	21	-0.5574	0.353	0.045
1998-2002	18	0.4623	0.410	0.043
1997-2002	15	-0.0498	0.950	0.000

* Significant at 10 % level
** Significant at 5 % level
*** Significant at 1 % level

No clear evidence supporting the rejection of *Hypothesis II* is found by analysing the regression results for bond funds. The findings do not display any patterns across table 7 panels with respect to the length of the prior period and the *p*- or R^2-values of regressions. Within the panels some trends are, however, observable. Panel A offers weak evidence indicating that longer time periods explain the future raw returns better, whereas Panel B displays opposite results for risk-adjusted returns. The inconsistency between the results of the two panels and the low explanation powers of the regressions do not support the rejection of *Hypothesis II* for bond funds.

The presented results apply only for the chosen time interval. Selection of different investment period could have changed the results dramatically. In this study, the time period 2003-2004 was chosen as the investment period for two reasons. Firstly, the purpose of this section of the thesis was, especially, to investigate the persistence of absolute performance for the period during which the relative performance of bond funds was shown to be persistent. Secondly, by choosing an earlier time period the number of observations would have been decreased.

Money market funds

Table 8 summarizes the findings from regression tests of absolute performance persistence for the money market funds reported in the Mutual Fund Reports. The power of average historical monthly returns to predict investment period (2003-2004) returns is examined for total returns and abnormal returns measured by Alpha. Empirical evidence presented in Panel A and Panel B of table 8 indicates strong persistence in absolute performance of money market funds. All but one of the slope coefficients exhibit statistically significant positive values at 1 % significance level.

Panel A displays the regression results from regressing investment period's average monthly total return over prior periods' average total returns. The findings suggest that average monthly total returns from periods of differing length ending to year 2002 had predictive power over the average return of the following two years. Money market fund returns are largely depended on only one variable: the level of interest rates in the economy. Interest rates rarely experience sudden large fluctuations, especially in the developed countries. Therefore, money market fund returns are expected to be relatively persistent. The results presented in table 8 confirm this expectation.

Interest rate movements within the Euro zone are the most likely reason why period 2000-2002 is the only time interval, during which average total return does not have statistically significant relationship with investment period average return. The interest rate set by the European Central Bank peaked at 4.75 %[15] during the year 2000. At the end of 2002, the ECB rate had been decreased to 2.75 %. During the years 2003-2004, the rate remained fairly

[15] See table 3.

stable. Since most of the money market funds in Finland invest in short-term securities within the Euro zone, the differences between the rate movements of investment period and the years 2000-2002 could explain the results for the period.

Table 8

Regression tests of performance persistence for money market mutual funds

The regression equation is $\Omega_{i,\,2003\text{-}2004} = a + b\Omega_{ij} + \varepsilon_i$, where $\Omega_{i,j}$ is the performance measure in question for fund i during period j.

Panel A: Regression of total return for period 2003-2004 over prior period total return Number of funds depicts the funds existing during period 2003-2004 and the indicated prior period.

Prior period	Number of Funds	Slope Coefficient (b)	*p-value*	R^2
2001-2002	20	3.2805***	0.000	0.749
2000-2002	17	2.2953	0.383	0.051
1999-2002	14	0.6521***	0.003	0.524
1998-2002	11	0.8618***	0.006	0.591
1997-2002	9	0.9889***	0.003	0.731

Panel B: Regression of Alpha for period 2003-2004 over prior period Alpha.

Prior period	Number of Funds	Slope Coefficient (b)	*p-value*	R^2
2001-2002	20	1.0400***	0.000	0.996
2000-2002	17	1.1102***	0.000	0.998
1999-2002	14	0.7756***	0.000	0.836
1998-2002	11	0.8578***	0.000	0.864
1997-2002	9	0.7552***	0.000	0.859

* Significant at 10 % level
** Significant at 5 % level
*** Significant at 1 % level

Panel B displays the results from the regressions for Alpha. All slope coefficients obtain highly significant values. The findings indicate strong persistence in abnormal returns over time. Slope coefficients of the two shortest prior periods show a straight forward relationship between their average return and investment period's average return: A percentage point increase in the preceding period's mean return predicts a percentage point increase for the investment period. The values of the slope coefficients decrease when the length of the prediction period is increased. Explanatory power of the regression decreases, similarly to slope coefficient values, with the length of the prior period. Despite the decreasing pattern,

R^2-value remains high throughout the regressions. The number of observations is considerably smaller for longer prior periods. Number of funds decreases from 20 for 2001-2002 to 9 for 1997-2002. It is likely that the smaller number of observations is the main reason for the pattern in the explanatory power of the regression model. Therefore, *Hypothesis II* is not rejected for money market funds based on the evidence provided in Panel B. R^2- and p-values of Panel A provide further evidence that does not support the rejection of *Hypothesis II.*

Overall, the empirical evidence reported in table 8 agrees with the results from the Spearman rank correlation tests. In addition to relative performance persistence, money market funds exhibit consistency in absolute performance. *Hypothesis I* is rejected for money market funds based on the results of regressions tests while *Hypothesis II* cannot be rejected.

6. DETERMINANTS OF FLOWS TO FINNISH FIXED INCOME MUTUAL FUNDS

The flow determinant study of this thesis is presented in this chapter. The chapter begins by introducing the methodologies used to examine the external fund growth of Finnish fixed income funds. After the methodology section, the results from the empirical tests are analysed.

6.1 METHODOLOGY

6.1.1 Categorisation of flows and funds

There are two ways to measure fund flows. First option is to measure the amount of net monetary flows into a fund. Alternatively, an attempt to control for the fund size can be made by measuring the growth rate of funds net assets (percentage flows). This alternative is based on the presumption that larger funds tend to receive larger net monetary flows. In this study, both flows are calculated and the determinants of the fund flows examined. The focus of the study is, however, on monetary flows and the results for percentage flows are reported for comparison[16]. Zhao (2005) notes that the monetary flow measure addresses more precisely

[16] Before the introduction of the euro, the flows are measured in Finnish markkas. Markka flows are converted into euros by using a fixed exchange rate of 5.94573 markkas/euro

practitioners concerns about what determines how investors direct their investment dollars. Focus of the this study is on the monetary flows, since the aim of this chapter is to examine what drives investors' decisions to invest into Finnish fixed income mutual funds.

In order to measure the flows, a set of monthly flows, spanning from January 1994 to December 2004, is created from the data presented in the Mutual Fund Reports. Fixed income funds are arranged into three categories: bond funds, corporate bond funds and money market funds. From this point on, the notation bond funds refers to the sample of bond funds, which excludes corporate bond funds. Flow determinants for each category are investigated individually. The division of all bond funds to the two categories presented is very robust. Corporate bond funds are separated from the other bond funds for two reasons. Firstly, and most importantly, they have different risk and return characteristics from the other bond funds, which invest mainly in securities issued by governments or supra-sovereign entities. Of all the bond categories, investment into corporate bonds provides the closest substitute for stock market investment. Secondly, corporate bond funds of Finnish origin are rather new phenomenon in the Finnish mutual fund market. The first corporate bond funds established by Finnish fund companies came to the market around the turn of the century. Therefore, examination of the differences in the flow determinants between the two fund categories provides information on whether investors use the same investment criteria's across old and new categories. Corporate bond funds have been reported as a separate category in the Mutual Fund Reports since the year 2002.

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Monetary flow (*FLOW*) is defined as the change in total assets in excess of appreciation similarly to Zheng (1999):

$$FLOW_{i,t} = ASSET_{i,t} - ASSET_{i,t-1}(1+R_{i,t}) - MASSET_{i,t} \qquad (7)$$

where

$ASSET_{i,t}$ = total assets of fund i at the end of month t;

$R_{i,t}$ = holding-period return of fund i during month t;

$MASSET_{i,t}$ = assets added to fund i during month t through acquisitions of other funds

By subtracting the assets acquired through acquisitions the flow measure is not disturbed by inflows which do not represent net new investments made by investors. The flows reported in

the Mutual Fund Reports include this subtraction and, therefore, do not need to be adjusted for the purposes of this study.

Percentage flow (*PFLOW*) is defined as the growth rate of funds assets resulting from monetary flows:

$$PFLOW_{i,t} = FLOW_{i,t} / ASSET_{i,t-1} \quad (8)$$

6.1.2 Flow determinants

Altogether 17 determinants are examined as potential determinants of external fund growth. 14 of the 17 determinants are used simultaneously in the regression. Multiple performance measures are not included in the same regression to avoid concerns of multicollinearity. The study is largely restricted to study the flow determinants available in the Mutual Fund Reports. Due to the length of the time period and the amount of funds included in this study, examination of additional flow determinants not reported in the Mutual Fund Reports is beyond the scope of this study. However, the effect of distributor organisation (bank, non-bank) on external fund growth is investigated. In Finland, banks are important distributors of funds and the role they occupy in the distribution of mutual funds is expected to have an effect on the flows.

The potential determinants of flows to Finnish bond and money market mutual funds investigated in this study are defined as follows:

Fund size = $ASSET_{i,t-1}$, when $FLOW_{i,t}$ is used as a dependent variable in the regressions
Fund size = $LASSET_{i,t-1}$, the natural logarithm of $ASSET_{i,t-1}$, when $PFLOW_{i,t}$ is used as a dependent variable in the regressions

Performance: Equity and bond fund investors have been shown to chase past performance (e.g. Chevalier and Ellison 1997, Sirri and Tufano 1998 and Zhao 2005). To test this finding for Finnish fixed income fund investors, funds are arranged into three groups based on their past performance. Total return (*TOTAL*) and Sharpe ratio (*SHARPE*) are used to measure fund performance. Sharpe ratio is chosen as an alternative to raw returns to study the effect of risk-

adjusted returns on the fund flows. The performance range variables are defined as follows for the total returns:

> $LOWPERF_{i,\,t-1}$: if the funds total monthly return is smaller than the first quartile of all funds' total returns during time period *t-1*, it is included in the low performance group.
> $HIGHPERF_{i,\,t-1}$: if the funds monthly total return is larger than the third quartile of all funds' total returns during time period *t-1*, it is included in the high performance group.
> $MIDPERF_{i,\,t-1}$: if a fund is not included in the high or low performance group, it is included in the middle performance group.

Performance range variables are defined similarly for $LOWSHARPE_{i,\,t-1}$, $MIDSHARPE_{i,\,t-1}$ and $HIGHSHARPE_{i,\,t-1}$. Sharpe ratios are not calculated for money market funds for the reasons pointed out in the preceding chapters of this thesis. Therefore, Sharpe ratios are not included as potential flow determinants for money market funds.

In addition to measuring the effect of relative performance on fund flows, the effect of absolute performance on external fund growth is examined. *AVRET*, five-year average monthly return of a fund, measures the fund's absolute performance. If the fund has less than five years of historical data, the average of monthly return until the point of observation is used instead.

Fund age: Fund's age (*AGE*) is included in the regressions to test whether the age of a fund has an effect on the fund selection.

Fund's asset size, age and performance are expected to have positive influence on fund flows. The hypothesis is that the larger or older the fund, the more established it is on the fund market and hence, the easier it is to attract new investments into the fund

Expenses and load dummies: Funds expenses (*EXPENSE*) are depicted by the expense ratio, which is defined as the annual percentage of the total value of the fund. The expense ratio reported in the Mutual Fund Reports consists of a management fee and a custody fee.

To test the effect of loads on fund flows three load dummy variables are introduced. *FLOAD*, *BLOAD* and *LLOAD* take the value of 1 if the fund is, respectively, a front-end load fund, a back-end load fund or a level-load fund. Otherwise they take the value of zero. Expenses and loads of the funds are expected to have negative impact on the flows.

Distributor organisation: Dummy variable *BANK* was created to take into account the differences in distributor organisations and the effect the differences might have on the fund flows. If a fund is distributed by a bank, or a fund management company owned by a bank, then *BANK* takes the value of 1 and the value 0 otherwise. A distributor organisation is defined as a bank, if it has a network of branch offices. Many former Finnish investment companies have sought and gained bank status, but do not have significant retail banking operations or branch networks. These banks were not assigned bank status in this study.

The role of banks as fund distributors is expected to have a positive impact on the fund flows. At the end of 2005, three largest retail banks in Finland managed nearly 80 % of the mutual fund market assets through their fund management companies. Due to the large ownership of banks in the Finnish fund management companies, Korpela and Puttonen (2005) conclude that "It is quite obvious that existing customer relationship and convenience play a major role in mutual fund customer behaviour".

6.1.3 Regression model

The following statistical model is employed to study the external growth determinants with a (cross-sectional time series) panel regression.

$$FLOW_{i,t} = \alpha + \beta_1 ASSET_{i,t-1} + \beta_2 FLOW_{i,t-1} + \beta_3 FLOW_{i,t-2} + \beta_4 FLOW_{i,t-3} + \beta_5 LOWPERF_{i,t-1} + \beta_6 MIDPERF_{i,t-1} + \beta_7 HIGHPERF_{i,t-1} + \beta_8 AVRET_{i,t-1} + + \beta_9 EXPENSE_{i,t-1} + \beta_{10} AGE_{i,t-1} + + \beta_{11} FLOAD_i + \beta_{12} BLOAD_i + \beta_{13} LLOAD_i + \beta_{14} BANK_i + \mu_i + \varepsilon_{i,t} \quad (9)$$

The regression model is similar when $PFLOW_{i,t}$ is used as a dependent variable with the following exceptions: $ASSET_{i,t-1}$ is replaced by $LASSET_{i,t-1}$ and $FLOW_{i,t-1}$, $FLOW_{i,t-2}$ and $FLOW_{i,t-3}$ are replaced by $PFLOW_{i,t-1}$, $PFLOW_{i,t-2}$ and $PFLOW_{i,t-3}$, respectively.

Following Zhao (2005) three lagged dependent variable terms $FLOW_{i,t-1}$, $FLOW_{i,t-2}$ and $FLOW_{i,t-3}$ are included in the regression. Additionally, Warther (1995) reported that aggregate mutual fund flows follow an AR(3)[17] process.

The regression model includes majority of the information provided in the Mutual Fund Reports. Therefore, the explanatory power of the regression model describes to what extent the information disclosed in the Mutual Fund Reports affects investors' decisions to invest into Finnish fixed income funds.

6.2 EMPIRICAL RESULTS

6.2.1 Descriptive statistics

Descriptive statistics for each of the examined fund categories are summarized in table 9. Money market funds are by far the largest fund group with an average size of approximately € 179 million and average monthly flows of € 3.37 million. In addition, the mean external growth rate (*PFLOW*) has been the highest for money market funds. Interestingly, an average bond fund has, on average, received as much monthly inflows as outflows between the years 1994 and 2004. The median values for *FLOW* and *PFLOW* are zero for bond funds.

The values for *TOTAL* and *SHARPE* present the average total returns and Sharpe ratios (if applicable), respectively, for each fund category. Return characteristics for bond and corporate bond funds are fairly similar, whereas money market funds produce lower, but considerably more stable returns, consistent with expectations. Similar trends are observable in the management and load fees charged by the funds in each category. The management fees are considerably higher for the other two categories than for money market funds. This is understandable and expected, since the management of a bond fund is likely to require more efforts than managing a money market fund. Money market funds charge investors mainly at the time of funds withdrawal. *BLOAD* obtains larger mean value than *FLOAD*. Corporate bond fund investors have to pay fees, on average, when they inject money into the fund and when they withdraw money from the fund. Most of the bond funds have back-end or level-load fee structure. Over half of the bond fund observations are for funds that are managed by

[17] Autoregressive process with three lagged dependent variable terms.

a fund company owned by a Finnish bank. The ratio is below 50 % for corporate bond and money market funds.

Table 9

Descriptive statistics for fixed income funds
(standard deviations in parenthesis)

Variable		Bond funds	Corporate bond funds	Money market funds
FLOW (€ million)[a]	mean	0.46	1.50	3.37
	median	0.00	0.11	0.70
		(5.92)	(7.62)	(29.08)
PFLOW (%)	mean	2.67 %	2.55 %	3.92 %
	median	0.00 %	0.52 %	1.30 %
		(43.05 %)	(12.33 %)	(19.75 %)
ASSET (€ million)	mean	57.00	68.15	178.73
	median	41.60	45.85	90.80
		(54.97)	(65.06)	(277.09)
TOTAL (%)	mean	0.53 %	0.59 %	0.25 %
	median	0.60 %	0.70 %	0.24 %
		(1.04 %)	(1.16 %)	(0.16 %)
SHARPE	mean	0.12	0.28	n/a
	median	1.04	0.36	n/a
		(0.18)	(1.20)	n/a
EXPENSE (%)	mean	0.60 %	0.62 %	0.45 %
	median	0.60 %	0.63 %	0.50 %
		(0.23 %)	(0.22 %)	(0.15 %)
AGE (Years)	mean	4.93	2.12	3.76
	median	4.25	1.92	3.34
		(3.38)	(1.26)	(2.36)
BANK	mean	0.54	0.34	0.45
	median	1.00	0.00	0.00
		(0.50)	(0.47)	(0.50)
FLOAD	mean	0.11	0.13	0.07
	median	0.00	0.00	0.00
		(0.32)	(0.34)	(0.26)
BLOAD	mean	0.43	0.09	0.37
	median	0.00	0.00	0.00
		(0.50)	(0.28)	(0.48)
LLOAD	mean	0.44	0.78	n/a
	median	0.00	1.00	n/a
		(0.50)	(0.41)	n/a

[a] Before the introduction of the euro, the flows are measured in Finnish markkas.
Markka flows are converted into euros by using a fixed exchange rate of 5.94573 markkas/euro

To alleviate any concerns over multicollinearity in the regression model, the pairwise correlations between the explanatory variables are calculated. Table 10 presents the results for the bond fund sub sample. The largest correlation of 0.45 is observed between fund size and fund age. Additionally, the correlation between fund expenses and front-end load dummy variable is 0.42. Otherwise, the correlations between explanatory variables remain low and

dispel concerns over multicollinearity problems in the regression model. Since the correlation matrices for the other considered sub samples are very similar to the one presented for bond funds, these matrixes are not reported here.

Table 10

Correlation matrix of flow determinants for bond funds

The table presents the correlation between the examined determinants of external mutual fund growth for bond fund sub sample.

	$ASSET_{t-1}$	$FLOW_{t-1}$	$FLOW_{t-2}$	$FLOW_{t-3}$	$LOWPERF_{t-1}$	$MIDPERF_{t-1}$	$HIGHPERF_{t-1}$	$AVRET_{t-1}$	$EXPENSE_{t-1}$	AGE_{t-1}	*FLOAD*	*BLOAD*	*LLOAD*	*BANK*
$ASSET_{t-1}$	1													
$FLOW_{t-1}$	0.09	1.00												
$FLOW_{t-2}$	0.11	0.28	1.00											
$FLOW_{t-3}$	0.11	0.11	0.26	1.00										
$LOWPERF_{t-1}$	-0.02	-0.01	0.01	0.00	1.00									
$MIDPERF_{t-1}$	-0.03	-0.01	-0.04	-0.02	-0.62	1.00								
$HIGHPERF_{t-1}$	0.06	0.02	0.03	0.03	-0.24	-0.61	1.00							
$AVRET_{t-1}$	0.08	0.05	0.01	0.00	-0.06	0.01	0.04	1.00						
$EXPENSE_{t-1}$	-0.10	-0.04	-0.05	-0.05	0.05	-0.04	0.00	-0.10	1.00					
AGE_{t-1}	0.45	-0.04	-0.06	-0.07	-0.05	0.09	-0.07	0.04	0.21	1.00				
FLOAD	0.02	-0.02	-0.02	-0.02	0.05	-0.08	0.04	0.06	0.42	0.29	1.00			
BLOAD	-0.07	0.00	0.00	0.00	-0.08	0.09	-0.03	0.00	-0.36	-0.04	-0.31	1.00		
LLOAD	0.06	0.00	0.01	0.01	0.05	-0.04	0.00	-0.03	0.08	-0.13	-0.32	-0.78	1.00	
BANK	0.19	0.02	0.02	0.02	-0.01	0.00	0.00	-0.03	0.09	0.20	0.33	-0.48	0.29	1

6.2.2 Monetary flows

Full sample period

Table 11 reports the estimation results from the monetary flow regressions for Finnish bond, corporate bond and money market mutual funds. Results are based on the regression of full sample for each category. The last rows of table 11 show the explanatory power and *F*-value of the regression for each fund category. Examination of the explanatory powers reveals that the regression does not have high explanatory power over the flows to any of the fund categories. Apparently, some important determinants of Finnish fixed income mutual fund flows are omitted. Consequently, it seems that the Mutual Fund Reports do not provide all necessary information to accurately model the external fund growth of fixed income funds. However, the *F*-statistic of the regression is statistically significant across all fund categories indicating that the results obtained for each flow determinant are valid and necessitate further discussion.

Contrary to the preconceptions, bond fund size is found to exhibit negative impact on the fund flows. This result is consistent with a previous study by Zhao (2005) and with the non-bank

related Finnish equity fund sample of Torkkeli (2002). Zhao found asset size to be negatively correlated with fund flows for five out of six bond fund categories included in the study. The findings in table 10 are not as consistent throughout the fund categories as those of Zhao. Fund size is not shown to have an effect on the flows to corporate bond and money market funds.

Empirical evidence from the regressions rejects the hypothesis that fund age would have an impact on the external fund growth. The slope coefficient for *AGE* obtains statistically insignificant values for every fund category. The finding differs from Zhao's results. He reports a negative relationship between fund age and fund flows for all but one of the examined bond fund groups.

Consistent with Thorén's (1998) findings, the external fund growth of previous months explains the flows to Finnish fixed income funds with statistical significance. Warther (1995) and Zhao (2005) have reported similar results for U.S data. All three lagged flow variables have an effect on bond fund flows, whereas for other fund categories only some of the lagged flow coefficients have statistically significant values. Contrary to Thorén's findings, the external growth of the previous month is not shown to affect the external growth of money market funds. However, the flows of the two months preceding the previous month appear to have a positive effect on the flows to money market funds. External fund growth of the previous month is found to have an impact on the flows to corporate bond funds, whereas the growth during the two earlier months does not affect fund flows based on the reported findings.

The results for the performance variables are surprising in light of the findings from the performance persistence study of this Master's Thesis. Relative performance of fixed income funds is not found have an effect on the fund flows[18]. The results are similar to those of Kasanen, Lipponen and Puttonen (2001) for Finnish bank related mutual funds. Zhao (2005) found investors in U.S bond funds to chase relative performance based on raw returns only in the middle range of performance. The investment decisions of Finnish money market fund

[18] The relative performance presented in table 11 is based on funds' total returns. The results are nearly identical when Sharpe ratio is used to measure performance. Therefore, this chapter does not report the results for Sharpe ratio separately.

investors do not appear to be driven by the relative performance of funds, even though the previous chapter showed that money market funds exhibit strong performance persistence.

Based on the inconcise evidence for performance persistence of bond funds presented in Chapter 5, an investor is not expected to gain from investing into the current best performers. The findings presented in table 11 indicate that bond fund investors do not chase relative past performance. They are, however, found to chase absolute past performance. The positive estimate for *AVRET* is significant at 5 % level. A one basis point increase in *AVRET* is associated with approximately € 675 000 extra money flow into a bond fund. The number is extremely high and should be considered only as an indication of the significance of past average return as a determinant of external fund growth. The finding of absolute performance-flow relationship for bond funds is somewhat similar to Torkkeli's (2002) results for Finnish equity funds. Estimates of *AVRET* for money market and corporate bond funds do not have statistical significance. Therefore, the evidence suggests that investors in those funds do neither chase relative nor absolute performance. The results for money market funds are inline with Thorén's (1998) findings.

Consistent with Kasanen et al. (2001), empirical evidence from the regressions indicates that management fees and load fees have no effect on external fund growth. The results are robust to the fund category investigated. The estimates for *EXPENSE* are insignificant across fund categories. Barber et al. (2005) find that U.S mutual fund investors are more salient to in-your-face fees like front-end loads. Examination of load dummy variables' *p*-values reveals that the estimate for front-end load is nearly significant at 10 % level for bond funds. This value in accordance with the estimates of *FLOAD* for other fund categories is not enough to reinforce the findings of Barber et al. for investors in Finnish fixed income funds.

The hypothesis that the role occupied by banks in the distribution of mutual funds has an effect on the flows to Finnish fixed income funds is supported by the findings. Slope coefficient values for *BANK* are statistically significant at 5 % level for corporate and money market funds. Estimates for *BANK* imply that a fund's bank relation increases monthly flows to the fund, on average, by € 1.3 million and € 4.4 million for corporate and money market funds respectively. The effect of fund's bank relation to its' external growth is contrary to Thorén's (1998) finding for Finnish balanced funds. The flows to bond funds do not

Table 11

Determinants of monetary flows into fixed income funds

Funds ranked by their total monthly return (*p*-values in parenthesis).[a]

Variable Observation period	Expected coefficient sign (+/-)	Bond funds 1994-2004	Corporate bond funds 2000-2004	Money market funds 1996-2004
$ASSET_{t-1}$	+	**-0.0081*** **	0.0092	-0.0006
		(0.001)	(0.132)	(0.845)
$FLOW_{t-1}$	+	**0.2255*** **	**0.2571*** **	0.0254
		(0.000)	(0.000)	(0.306)
$FLOW_{t-2}$	+	**0.0373** **	0.0369	**0.0526** **
		(0.044)	(0.373)	(0.037)
$FLOW_{t-3}$	+	**0.0829*** **	0.0619	**0.1142*** **
		(0.000)	(0.131)	(0.000)
$LOWPERF_{t-1}$	-	-3.8070	-56.7159	24.1385
		(1.000)	(1.000)	(1.000)
$MIDPERF_{t-1}$	+/-	-3.5024	-56.9419	22.4535
		(1.000)	(1.000)	(1.000)
$HIGHPERF_{t-1}$	+	-3.4225	-56.7830	27.1331
		(1.000)	(1.000)	(1.000)
$AVRET_{t-1}$	+	**67.5380** **	-0.7516	1683.3042
		(0.019)	(0.993)	(0.182)
$EXPENSE_{t-1}$	-	-49.5558	150.6270	-144.3714
		(0.395)	(0.308)	(0.760)
AGE_{t-1}	+	0.0426	0.1910	-0.0170
		(0.288)	(0.457)	(0.958)
FLOAD	-	-1.9110	58.5126	-3.1004
		(0.108)	(1.000)	(0.251)
BLOAD	-	-1.6149	57.2900	-0.5323
		(0.149)	(1.000)	(0.719)
LLOAD	-	-1.5680	57.4318	n/a
		(0.163)	(1.000)	(n/a)
BANK	+	0.3879	**1.3430** **	**4.4309*** **
		(0.149)	(0.049)	(0.006)
No. of observations		2778	654	1911
Overall R^2		0.078	0.149	0.028
F-value		16.68	4.25	7.98
F-significance		0.000	0.000	0.000

*Significant at the 10 percent level

**Significant at the 5 percent level

***Significant at the 1 percent level

[a] Table presents the regression estimates for the following regression: $FLOW_{i,t} = \alpha + \beta_1 ASSET_{i,t-1} + \beta_2 FLOW_{i,t-1} + \beta_3 FLOW_{i,t-2} + \beta_4 FLOW_{i,t-3} + \beta_5 LOWPERF_{i,t-1} + \beta_6 MIDPERF_{i,t-1} + \beta_7 HIGHPERF_{i,t-1} + \beta_8 AVRET_{i,t-1} + \beta_9 EXPENSE_{i,t-1} + \beta_{10} AGE_{i,t-1} + \beta_{11} FLOAD_i + \beta_{12} BLOAD_i + \beta_{13} LLOAD_i + \beta_{14} BANK_i + \mu_i + \varepsilon_{i,t}$

where, $FLOW_{i,t}$ is the monetary flow to fund *i* at time *t*, $ASSET_{i,t-1}$ depicts total assets of the fund at time *t-1*, $FLOW_{i,t-1}$, $FLOW_{i,t-2}$ and $FLOW_{i,t-3}$ are the lagged flows to fund *i* at times *t-1*, *t-2* and *t-3*, respectively. $LOWPERF_{i,t-1}$, $MIDPERF_{i,t-1}$ and $HIGHPERF_{i,t-1}$ depict fund *i*'s relative performance based on total returns. They obtain a value of 1 if the fund belongs to the defined group and a value zero otherwise. $AVRET_{i,t-1}$ presents fund *i*'s average return over past five years. $EXPENSE_{i,t-1}$ is the expense ratio of a fund and $AGE_{i,t-1}$ the funds age. Dummy variables $FLOAD_i$, $BLOAD_i$ and $LLOAD_i$ obtain value of 1, if the fund is, respectively, front-end load fund, back-end load fund or level-load fund. Otherwise they obtain value 0. Dummy variable $BANK_i$ takes the value of 1, if the fund is distributed by a bank and 0 otherwise.

appear to be largely affected by the bank relation. *P*-value of the estimate for *BANK* is significant at 15 % level for bond funds hinting a weak relation between external fund growth and bank relation. Empirical evidence of this study suggests that Korpela and Puttonen (2005) are right in stating the following: "The major banks (in Finland) are able to use their customer loyalty to efficiently cross-sell mutual fund shares to existing retail and institutional customers. Banks are efficiently using their extensive branch networks to retain their clients."

Sub periods

Table 12 reports the regression estimates for the partitioned bond and money market fund samples. The investigation periods of the fund categories are divided into two halves of approximately equal length. The division is conducted to study whether some of the determinants observed for the full investigation period are time dependent.

The findings presented in table 12 indicate that the determinants of external fund growth found for the full sample apply, to a large extent, for the partitioned samples. Asset size of a bond fund appears to affect the fund growth negatively throughout the time period of the study. *ASSET* estimates obtain strongly significant negative values for both bond fund sub sample regressions. Apparently, larger bond funds experience more troubles in attracting additional money flows than their smaller counterparts. Asset size seems to have a negative impact on money market fund flows during the period 1996-1999. Slope coefficient value of *ASSET* is significant even at 1 % level for the aforementioned period. This effect is not carried through to the more recent investigation period. The results show no relation between the asset size and the external money market fund growth between the years 2000 and 2004. The results suggest that during the period when Finnish mutual fund market was in its more immature state, it was easier for smaller sized money market funds to attract additional investments from investors. This relative advantage has disappeared as the market has matured.

Fund age and asset size are positively correlated[19]. Thus, one would expect them to have similar effect on the external fund growth. In light of the results discussed in the previous paragraph, the age of a fund is expected to have a negative impact on external fund growth

[19] See table 10.

during the entire study period for bond funds and during the period 1996-1999 for money market funds. The estimates for *AGE* are, partly, in sharp contrast with expectations. Fund age is found to influence external bond and money market fund growth positively during the

Table 12

Determinants of monetary flows into fixed income funds for sub periods.
Funds ranked by their total monthly return (*p*-values in parenthesis).[a]

Variable	Expected coefficient	Bond funds	Bond funds	Money market funds	Money market funds
Observation period	sign (+/-)	1994-1999	2000-2004	1996-1999	2000-2004
$ASSET_{t-1}$	+	**-0.0079*** **	**-0.0110*** **	**-0.0625*** **	0.0003
		(0.000)	(0.001)	(0.000)	(0.942)
$FLOW_{t-1}$	+	**0.3330*** **	**0.1958*** **	**0.1784*** **	-0.0024
		(0.000)	(0.000)	(0.000)	(0.939)
$FLOW_{t-2}$	+	**0.1853*** **	0.0112	**0.3202*** **	0.0146
		(0.000)	(0.632)	(0.000)	(0.646)
$FLOW_{t-3}$	+	**0.1952*** **	**0.0563** **	**0.1799*** **	**0.0965*** **
		(0.000)	(0.013)	(0.000)	(0.003)
$LOWPERF_{t-1}$	-	-1.6637	2.9657	132.5878	127.4109
		(1.000)	(1.000)	(1.000)	(1.000)
$MIDPERF_{t-1}$	+/-	-1.7018	3.3766	137.4011	122.4464
		(1.000)	(1.000)	(1.000)	(1.000)
$HIGHPERF_{t-1}$	+	-1.7803	3.7098	135.8536	130.4391
		(1.000)	(1.000)	(1.000)	(1.000)
$AVRET_{t-1}$	+	32.5340	33.7157	**2470.1782***	985.0071
		(0.111)	(0.608)	(0.077)	(0.610)
$EXPENSE_{t-1}$	-	-63.4447	-72.2142	-89.5271	-0.1932
		(0.272)	(0.468)	(0.842)	(1.000)
AGE_{t-1}	+	**0.1092** **	0.0347	**1.038***	-0.3843
		(0.032)	(0.568)	(0.085)	(0.413)
FLOAD	-	0.3460	-2.2748	-2.4250	3.3251
		(0.875)	(0.150)	(0.255)	(0.653)
BLOAD	-	0.5105	-1.7352	0.3969	0.1051
		(0.232)	(0.217)	(0.789)	(0.964)
LLOAD	-	0.4960	-1.7116	n/a	n/a
		(0.822)	(0.231)	(n/a)	(n/a)
BANK	+	0.3482	0.3254	2.3751	**7.3288*** **
		(0.159)	(0.467)	(0.123)	(0.005)
No. of observations		1072	1706	793	1118
Overall R^2		0.311	0.055	0.125	0.036
F-value		34.09	7.04	8.53	3.18
F-significance		0.000	0.000	0.000	0.000

*Significant at the 10 percent level
**Significant at the 5 percent level
***Significant at the 1 percent level

[a] Regression is defined similarly to table 11.

earlier sub periods. No statistically significant relationship between fund age and fund flows is detected for the later sub periods.

External fund growth of the previous months appears to have a more positive effect on money flows to funds during the earlier years of the investigation period. Across fund categories all three lagged flow variables obtain estimates with strong statistical significance for the earlier period. Although observable, the effect of previous months fund flows on external fund growth is not as strong during the later examination period. Consistent with the findings for the full sample, bond fund flows are more dependent on the previous months fund growth than money market flows during the later examination period.

Empirical evidence presented in table 12 corroborates the earlier finding from the full sample that Finnish fixed income fund investors do not chase relative past performance. Based on the results of Chapter 5, an investor would have, on average, benefited from investing into the best performing money market funds throughout the investigation period of the study and into the best performing bond funds for the period 2000-2004. The results for the absolute performance-flow relationship are somewhat surprising in light of the full sample findings. Historical absolute performance was found to affect external fund growth of bond funds. This phenomenon is unobservable for both sub periods examined. The *p*-values of the *AVRET* estimates, however, indicate that absolute performance was more important determinant of fund flows during the earlier years included in this study. Results for money market funds exhibit similar trend. A positive absolute performance-flow relationship is observed for the period 1996-1999, whereas the estimate of *AVRET* is insignificant for the more recent sub period. Apparently, the full sample findings for money market funds with respect to absolute past performance were dominated by the observations between the years 2000 and 2004.

The results for the sub periods are consistent with the findings for the full investigation period with respect to management and load fees. No empirical evidence is found, which would suggest that the fee structure of a fixed income mutual fund affects the investment decisions of Finnish fixed income fund investors.

Table 11 provided evidence that the bank relation of a money market fund affects the external fund growth. Results for the sub periods provide interesting details about the development of this relationship over time. Table 12 reports statistically significant estimate value for dummy

variable *BANK* between years 2000 and 2004. The estimate for the earlier period is insignificantly different from zero. It seems that as the Finnish mutual fund market has matured the major banks have become successful in cross-selling their money market funds to their existing client base. The results indicate that bank related money market funds have received, on average, an extra monthly inflow of € 7 million compared to other money market funds. No evidence about the effect of funds bank-relation on its growth is found for bond funds. One possible explanation for the differences in results between the fund groups could be that banks are able to market money market funds as direct "risk-free" substitutes for deposits towards their current client base. Bond funds cannot be considered as direct substitutes for deposits. The positive relationship between funds bank-relation and money flows found for corporate bond funds does not support the suggested "deposit substitute" explanation.

6.2.3 Percentage flows

Table 13 presents the results from the percentage flow regressions. Percentage flow measure presents the growth rate of a fund and thus, controls for the effect of fund size on external fund growth. This section discusses the main differences between the regression results of percentage and monetary flows for the full investigation period of the study.

Contrary to the findings for monetary flows, asset size of a fund is found to be negatively related to fund growth not only for bond funds, but also for money market funds. If there is a negative relationship between fund size and external fund growth, percentage flow measure is more accurate in finding it. Therefore, it can be concluded that money market fund size has a negative effect on external growth rate of a fund. The effect on fund growth is, however, in monetary terms indistinguishable from zero.

The results for money market funds differ in one additional aspect from the results obtained for monetary flows. Performance-flow relationship between the absolute performance and percentage flows is now observable. A basis point increase in *AVRET* is associated with 0.19 % increase in the growth rate of the fund.

External bond fund growth rate appears to be less related to fund's growth rate during previous months than monetary growth. The estimate for lagged *PFLOW* is significant only

Table 13

Determinants of percentage flows into fixed income funds
Funds ranked by their total monthly return (*p*-values in parenthesis).[a]

Variable Observation period	Expected coefficient sign (+/-)	Bond funds 1994-2004	Corporate bond funds 2000-2004	Money market funds 1996-2004
$LASSET_{t-1}$	+	**-0.0742*** **	-0.0043	**-0.0231*** **
		(0.000)	(0.320)	(0.000)
$PFLOW_{t-1}$	+	**0.1098*** **	**0.1342*** **	-0.0016
		(0.000)	(0.001)	(0.940)
$PFLOW_{t-2}$	+	-0.0086	0.0079	**0.0415** **
		(0.653)	(0.280)	(0.041)
$PFLOW_{t-3}$	+	0.0086	**0.0413*** **	**0.1344*** **
		(0.642)	(0.000)	(0.000)
$LOWPERF_{t-1}$	-	0.9389	-0.9073	-2.2842
		(1.000)	(1.000)	(1.000)
$MIDPERF_{t-1}$	+/-	0.9010	-0.9131	-2.2724
		(1.000)	(1.000)	(1.000)
$HIGHPERF_{t-1}$	+	0.9121	-0.9042	-2.2583
		(1.000)	(1.000)	(1.000)
$AVRET_{t-1}$	+	**5.8578** **	1.9980	**18.8690** **
		(0.015)	(0.226)	(0.025)
$EXPENSE_{t-1}$	-	-1.0817	**4.8072** **	-4.3135
		(0.806)	(0.032)	(0.188)
AGE_{t-1}	+	0.0027	-0.0050	-0.0010
		(0.341)	(0.160)	(0.675)
FLOAD	-	-0.1264	1.7762	-0.0215
		(0.152)	(1.000)	(0.228)
BLOAD	-	-0.0649	1.7394	-0.0012
		(0.434)	(1.000)	(0.904)
LLOAD	-	-0.1138	1.7641	n/a
		(0.173)	(1.000)	(n/a)
BANK	+	**0.0817*** **	0.0100	**0.0324*** **
		(0.000)	(0.328)	(0.002)
No. of observations		2709	593	1911
Overall R^2		0.050	0.135	0.069
F-value		10.06	6.46	10.89
F-significance		0.000	0.000	0.000

*Significant at the 10 percent level

**Significant at the 5 percent level

***Significant at the 1 percent level

[a] Regression is defined similarly to table 11 with the following exceptions: $FLOW_{i,t}$ is replaced by $PFLOW_{i,t}$, the growth rate of fund *i* at time *t*. Similarly, $FLOW_{i,t-1}$, $FLOW_{i,t-2}$ and $FLOW_{i,t-3}$ are replaced by $PFLOW_{i,t-1}$, $PFLOW_{i,t-2}$ and $PFLOW_{i,t-3}$. Finally, $ASSET_{i,t-1}$ is replaced by its' natural logarithm $LASSET_{i,t-1}$.

for the previous month. Controlling for fund size, a statistically significant relationship between bond fund's bank-relation and external growth is found. Bond funds that have been distributed by utilizing the branch networks of banks exhibit stronger growth rates than other bond funds. This finding suggests that banks have been successful in their marketing efforts towards customers.

Results for corporate bond funds offer some interesting deviations from the monetary flow regression findings. Bank relation of a fund does not have an impact on its' growth rate, although bank relation was found to increase the money flows into a corporate bond fund. Corporate bond funds is rather new fund category in the Finnish mutual fund market. Apparently banks have managed to attract the largest money flows into this new fund category, but after the initial large money flows bank-related funds have not experienced exceptional growth rates. Against all preconceptions, corporate bond fund management fees seem to have a positive effect on fund growth rate. Regression estimate for *EXPENSE* suggests that 0.1 percentage point increase in fund's management fee is associated with 0.48 percentage point increase in fund's growth rate. The finding implies that investors in Finnish corporate bond funds are not, at least, discouraged to invest into the funds by higher management fees.

7. CONCLUSION

Investing is sometimes described as a learning process. Over the last decade Finnish investors have become more familiar with mutual funds and increased their investments in them. Banks have started to provide mutual funds as a standard service and educated their clients about the funds. This study examines one relatively unexamined, yet the largest part of the Finnish mutual fund market, the fixed income funds. This Master's Thesis contributes to our understanding about the relationship between past and future fixed income fund returns and the determinants of external fixed income fund growth. The results should be of interest to both investors and fund management companies. A majority of Finnish bank directors have lately expressed their belief in the growing number of fixed income mutual fund investments. Therefore, they should have interest in discovering the determinants that drive investors' decisions to invest into these funds. On the other hand, knowledge about the performance

persistence phenomenon will help investors in formulating the decision criteria, based on which they choose between fixed income mutual funds in the Finnish market.

The performance persistence of bond and money market funds in the Finnish mutual fund market was investigated in Chapter 5 of this thesis. Additionally, the purpose of the chapter was to evaluate whether the information content of prior period, with respect to future fund performance, is dependent on its' length. The analysis was conducted by employing Spearman rank correlation tests and regression analysis. The following two hypotheses were examined:

Hypothesis I:
H_0: The performance of a fund on a certain period is independent of its' performance in the prior period.

Hypothesis II:
H_0: Information content of prior period performance is invariant to the length of the observation period of prior performance.

The empirical evidence reported strong evidence in favour of performance persistence in money market funds. Spearman rank correlation tests indicated consistency in relative money market fund performance, whereas regression analysis showed that also absolute performance of money market funds was persistent during the investigation period of the study. The results were consistent with earlier findings by Domian and Reichenstein (1998) and Dahlqvist et al. (2000). Abnormal return over the benchmark rate (Euribor/Helibor) explained future fund performance better than raw returns similarly to Hallahan (1999). The results were consistent over time and not severely influenced by survivorship bias in the sample. Therefore, *Hypothesis I* was rejected for money market funds. Because money market performance was, to a large extent, consistent between different combinations of evaluation and investment period, *Hypothesis II* was not rejected. The recommendation of Domian and Reichenstein, stemming from money market fund performance persistence, that individual investors should not settle for a slightly above median return, but instead should try to pick up a top-returning fund, seems to apply also for Finnish money market fund investors in light of the reported results.

The findings for bond funds were mixed. No evidence of consistent performance persistence throughout the observation period of the study was found. Hence, *Hypothesis I* was not rejected. Relative bond fund performance was persistent between periods 2000-2002 and 2003-2004. During the former period, bond funds did not exhibit performance persistence, whereas during the latter period bond funds performed consistently. Inconsistent with Sandvall (1999), no performance persistence was reported during the earlier years of the investigation period. Regression results showed that risk-adjusted absolute performance of bond funds was consistent in the short-term. Contrarily, raw absolute performance reversed in the long-term during the investigation period. These findings are consistent with Hallahan (1999), who found raw returns creating an overall impression of performance reversals, whereas use of risk-adjusted returns suggested the existence of performance persistence in his sample of Australian rollover funds. No evidence in favour of rejecting *Hypothesis II* was reported.

Overall, the performance persistence phenomenon in the Finnish fixed income mutual fund market is the strongest within money market funds. Whether this is due to superior performance of certain money market funds or a result driven by fund expenses is an interesting topic for future research. Additionally, it would be interesting to discover if the performance persistence is driven either by consistent underperformance or overperformance. This would aid investors in interpreting the results: should they pay more attention to avoiding the worst performers or lock into the best performers? Bond fund performance is not found to be consistent over time.

Chapter 6 of this thesis studied the determinants of external fund growth for Finnish fixed income mutual funds. The funds were divided into three categories (bond funds, corporate bond funds and money market funds) and the determinants of growth were investigated separately for each fund category. The aim was to analyse what drives investors' decisions to invest into the examined Finnish fixed income fund categories. Additionally, the purpose was to evaluate whether the information presented in the Mutual Fund Reports explains the flows into fixed income funds.

Fund size had a negative effect on fund flows for bond and money market funds. For bond funds this effect was consistent throughout the investigation period, whereas for money market funds it was observable only during the earlier years of the study. The result is

consistent with the earlier studies. Age of a fund was found to affect bond and money market flows positively during the earlier years of the study. The impact of fund age on external fund growth was insignificant for the full sample period across fund categories. Consistent with the earlier research, previous flows to funds had a positive effect on growth among all fund categories.

Consumer's decisions to invest into Finnish fixed income funds appear to be mostly driven by other concerns than fund performance. Relative fund performance did not exhibit any effect on the fund selection process of a Finnish fixed income fund investor. The finding is surprising in light of the detected consistency in money market fund performance. Absolute performance had a positive influence on the external growth of bond funds. The result that management and load fees do not affect fixed income flows corroborates the earlier findings for Finnish equity mutual funds. As initially hypothesized, the role of banks as distributors of Finnish mutual funds has an effect on fund flows. Bank related funds are found to receive higher flows than their non-bank counterparts. The results vary according to the time period examined and the flow measure used, but the message is clear: relation to a bank is beneficial for the external growth of a Finnish fixed income fund.

In general, some of the fund attributes disclosed in the Mutual Fund Reports do explain the growth of fixed income funds. However, other determinants, like the convenience in purchasing offered by funds bank relation, occupy an important role in the fund selection process. In future research, focus on finding these other determinants would provide valuable information to understand what drives investors' decisions to invest into Finnish mutual funds. Prior international research has shown that advertising has an effect on external fund growth. Kasanen et al. (2001) examine the effect of advertising for Finnish equity funds. However, the target group and advertising forms of fixed income funds may differ considerably from those of equity funds. Therefore, advertising of fixed income funds might have profoundly different effects on their external fund growth than advertising has on equity funds. Future research on the effects of advertising on fixed income fund growth could provide valuable information for fund management companies and other practitioners.

Bank relation of a fund had a positive impact on Finnish fixed income fund growth. Since banks manage the majority of the assets in the Finnish mutual fund market, it can be hypothesized that belonging to a large family of funds contributes to the external fund growth.

Instead to studying the bank relation, future research could concentrate on the impact of the size effect of fund family on mutual fund flows. Additionally, it would be valuable to know, whether specialisation of fund management company affects fund flows. Do investors trust fund management companies with a larger fixed income fund variety with their fixed income investments or do they direct all of their investments to the same fund company regardless of its' core expertise? Some fund management companies have so called open architecture. They sell funds of other foreign fund management companies to the investing public in addition to their own funds. Whether the service provided by open architecture funds assists in increasing the flows to their own funds would be an interesting topic to examine.

Finnish mutual fund investors invest proportionally more in fixed income funds than Europeans on average. They seem to be, however, only mildly interested in the performance of these funds at the time of investment decision making. Even though banks have taught Finnish consumers about mutual fund investing, the teachers may have skipped the lessons on performance evaluation. It appears that many consumers view fixed income mutual funds as a substitute to deposits only within the bank they hold their deposits in. When will the superior returns produced by some fixed income funds be enough to overcome the search costs and inconvenience associated with changing the fund company remains to be seen.

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